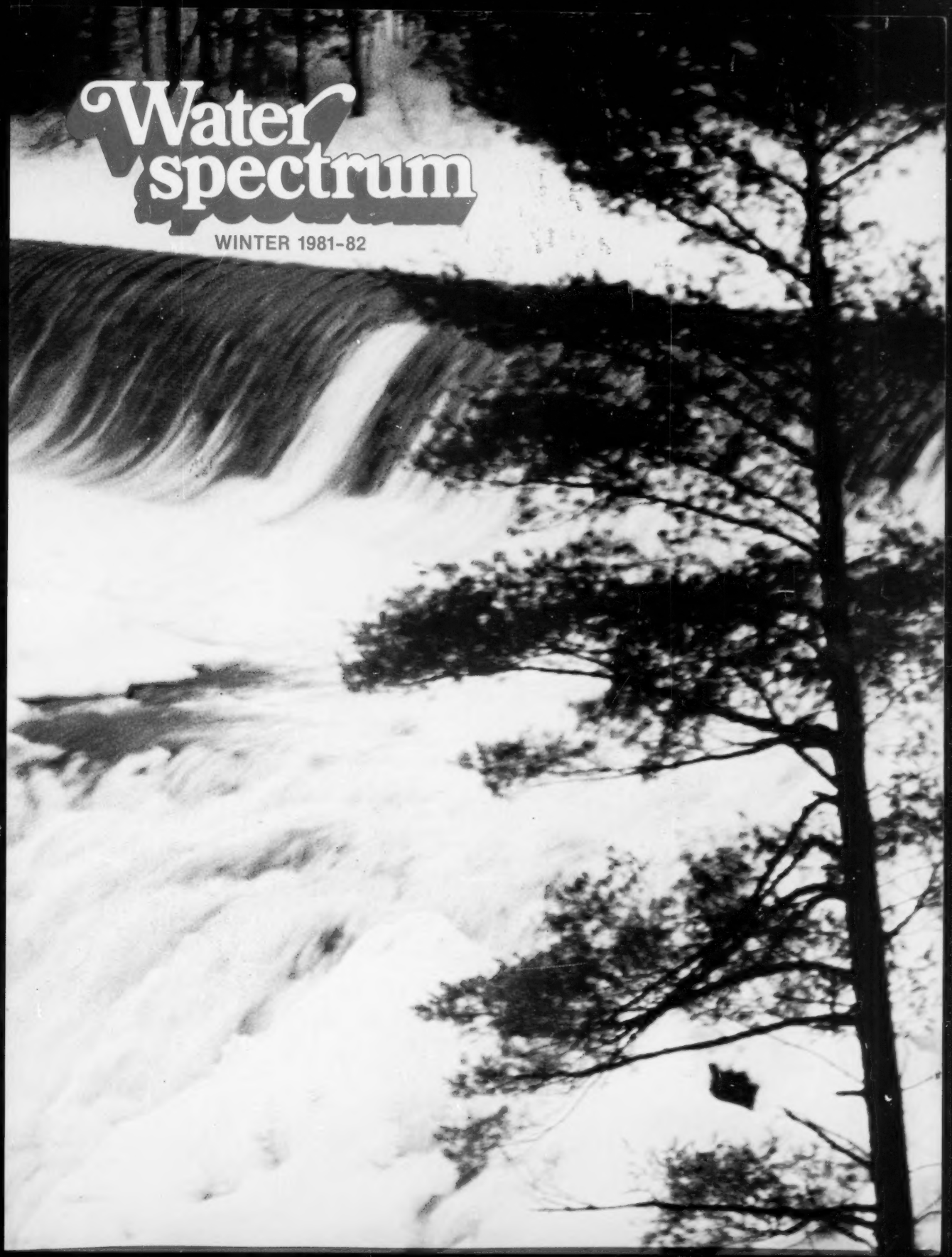
Water spectrum

WINTER 1981-82



Water spectrum

Published Quarterly | Vol. 14, No. 1 | Winter 1981-82

Secretary of the Army John O. Marsh

Assistant Secretary of the Army (Civil Works) William R. Gianelli

Chief of Engineers Lt. Gen. Joseph K. Bratton

Director of Civil Works Maj. Gen. E. R. Heiberg III

Editor-in-Chief Bob Norton

Editor Joyce Hardyman

Do the People Own the Shore?
by Margit Livingston
1

Part I: Public Access to Virginia's Tidelands
3

Part II: Legal Theories in Other Coastal States
7

China Journal: The Longtan Project
by Richard W. Galster and Edward C. Pritchett
12

Short Take: World Underwater Federation
by John C. Fine
26

Planning Versus Implementation: The Story of the Seventies
by Bory Steinberg
28

Environmental Compliance: A System: "CW-CELDS"
by Elizabeth Herrick
39

Events, Deeds & Deliberations
49

Comments on topics in this publication are invited. Send to:
Editor, Water Spectrum
U.S. Army Corps of Engineers
Water Resources Support Center (WRSC)
Fort Belvoir, VA 22060
Letters to authors c/o Editor will be forwarded.

Use of funds for printing this quarterly publication was approved by the Director of the Office of Management and Budget through June 30, 1982.

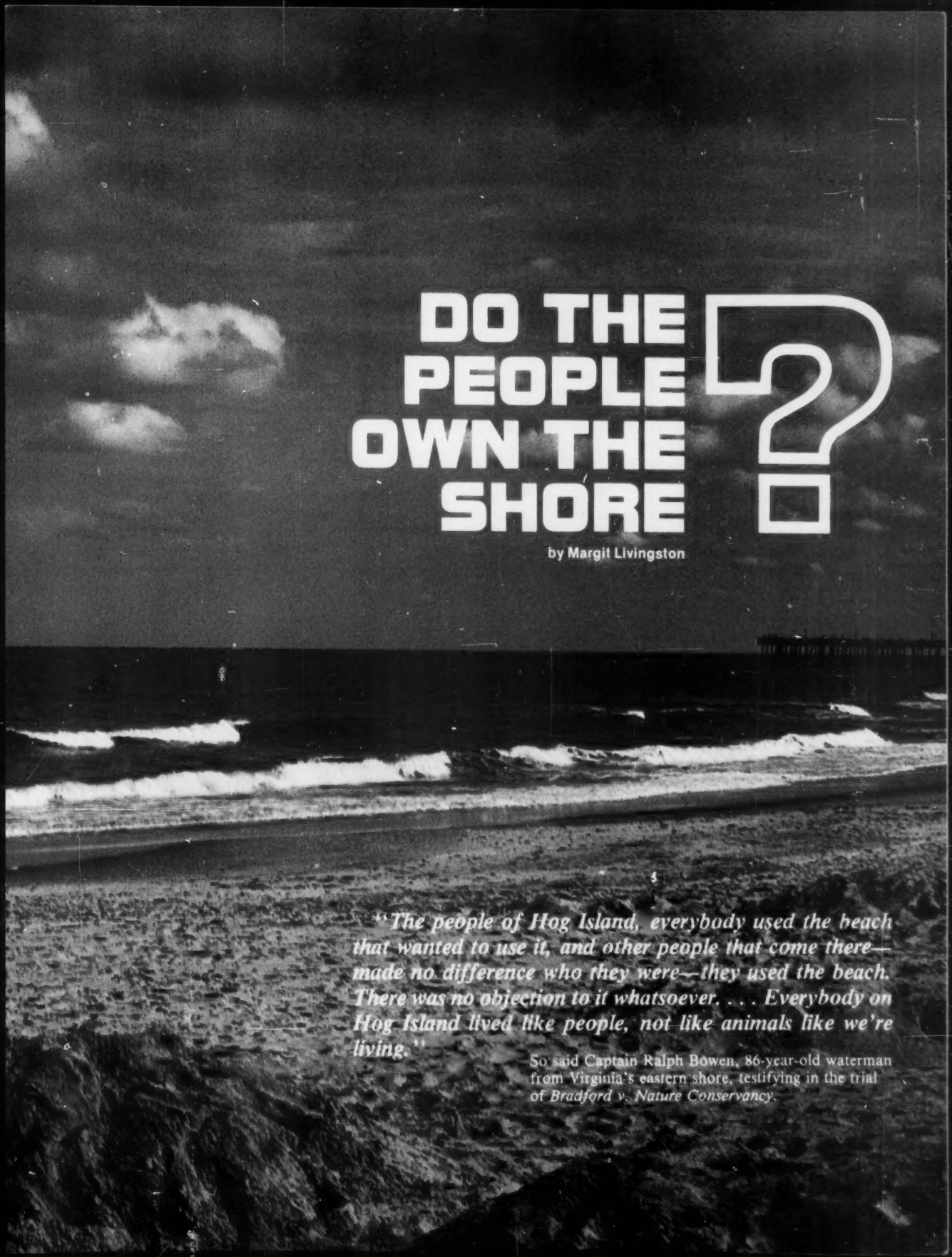
A major purpose of this publication is to serve as a written forum for the open discussion of issues and choices in resolving water resource problems. Views and conclusions expressed or implied do not necessarily reflect the position of the Corps of Engineers.

Subscription rate is $8.50 per year; $2.15 additional for foreign mailing. Price of a single copy is $3.25. Order directly from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

This issue developed by Publications & Training Office, WRSC.

Address changes: Please attach old address label to request for changes.

COVER: "Snow had fallen, snow on snow,
Snow on snow"
—Christina Georgina Rosetti



DO THE PEOPLE OWN THE SHORE?

by Margit Livingston

"The people of Hog Island, everybody used the beach that wanted to use it, and other people that come there—made no difference who they were—they used the beach. There was no objection to it whatsoever. . . . Everybody on Hog Island lived like people, not like animals like we're living."

So said Captain Ralph Bowen, 86-year-old waterman from Virginia's eastern shore, testifying in the trial of *Bradford v. Nature Conservancy.*

DO THE PEOPLE OWN THE SHORE?

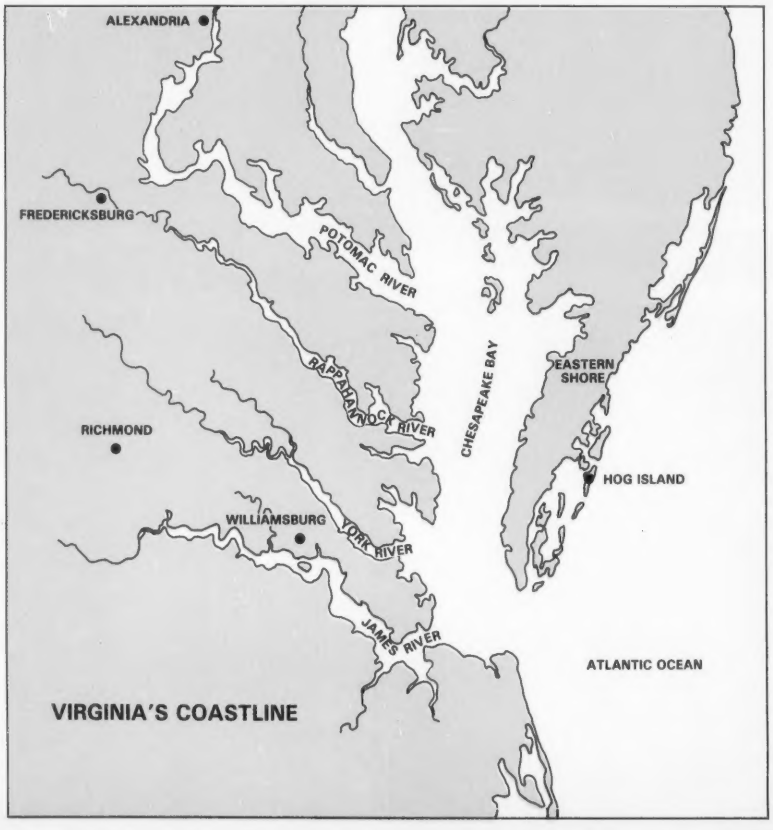
Since before the first English colonial settlement at Jamestown in 1607, the waterfront areas of Virginia have been used in common by the inhabitants for boating, fishing, and hunting. This tradition of free and common use of lands along tidal rivers, the Chesapeake Bay, and the Atlantic Ocean originated with the Indians before European settlement of the New World and has continued in one form or another to the present day. The watermen of Virginia's eastern shore, the thin peninsula that lies between the Chesapeake Bay and the Atlantic Ocean, long have relied upon free access to shore lands to carry on oystering, crabbing, clamming, and fishing—activities essential to their livelihood.

Recently, however, the Virginia watermen and recreational sportsmen have been challenged in their unrestricted use of beaches and other waterfront areas by private landowners asserting dominion over areas once thought to be common or public lands. The controversy resulted in two court cases, one brought in Federal court, the other in Virginia state court. Neither case has been resolved completely at this point, but both have stirred much interest in Virginia and other coastal states. The ultimate decisions in these cases will have a profound effect upon the extent of public use of waterfront lands.

Throughout the 1970s the classic confrontation over use of shoreline lands was between private developers and members of the public. Commonly, a private entrepreneur with plans to build a hotel or shopping center on beachfront property has faced stiff opposition from conservation-minded citizens attempting to prevent destruction of this environmentally sensitive area. The recent Virginia cases, however, do not involve this familiar scenario. On the contrary, a private conservation organization, standing in the position traditionally occupied by the developers, has sought to halt unauthorized public hunting, fishing, and driving of motor vehicles on coastal areas claimed by the organization.

Thus the conflict over beaches and coastal wetlands has become more complex and also more intense in recent years than ever before. With population expanding and the supply of undeveloped shoreline properties dwindling, the various groups interested in these areas are likely to collide frequently. Developers continue to see the coastline as a prime spot for resorts, hotels, and condominiums. Environmentalists are intensifying their efforts to protect the unique ecology of the marshes, dunes, and beaches from man's predations. Mining companies explore offshore sites for deposits of oil, natural gas, and minerals. Sports enthusiasts recognize the coastal areas as some of the best grounds for waterfowl hunting and surf casting. Commercial fishermen rely upon the rich abundance of fish and shellfish for their livelihood.

Recognizing the importance of coastal lands and the need to resolve the conflicts among potential users, many states have developed legal theories to draw the appropriate balance among public access, conservation of ecologically valuable areas, and private development. One of the recent court cases in Virginia has given new vitality to the "commons lands" doctrine, which preserves to the people the right to use common tidelands for their historic purposes of fishing, fowling, and hunting. This decision, though founded on Virginia's unique statutory scheme, has implications for other coastal states that recognize the public's right to use shore lands based upon other legal theories such as custom, implied dedication, or the public trust doctrine. ■



Ms. Livingston is an associate professor at the DePaul University College of Law, Chicago, Illinois 60604.

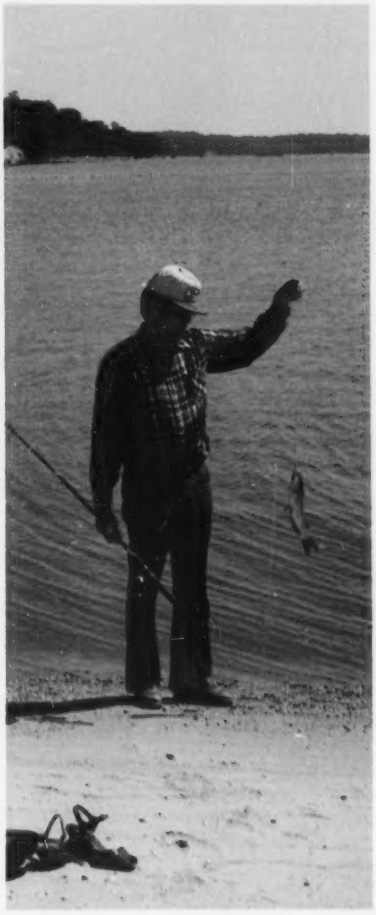
PART I: PUBLIC ACCESS TO VIRGINIA'S TIDELANDS

THE FEDERAL DECISION

The recent litigation in Virginia concerning shore lands access has consisted of both a Federal and a state suit. Both cases involved a dispute over public use of the shores of the Atlantic Ocean and the marshes and meadowlands of Hog Island, one of the barrier islands off Virginia's eastern shore.

In the Federal case, *Nature Conservancy v. Machipongo Club, Inc.* (1976), the plaintiff, Nature Conservancy, sought to enjoin members of a Hog Island sportsmen's club from entering what the conservancy asserted to be its property. The disputed areas included the intertidal strip on the Atlantic Ocean and the marshes and meadowlands on the bay side of the island. The conservancy, an organization devoted to acquiring and preserving environmentally valuable areas, had directed its Hog Island manager to allow fishing and some waterfowl hunting on the seashore and the low salt marshes. It objected, however, to overnight camping and the driving of motor vehicles on these areas because such activities tend to destroy the habitat of the estaurine and dune species. The sportsmen's club asserted the rights of its members, as members of the public, to go on these areas for legitimate recreational purposes without the conservancy's permission.

The Federal district court gave the plaintiff only partial relief. It found that the conservancy's landholdings on the Atlantic Ocean extended to mean low watermark, thus encompassing the intertidal strip. Members of the public, such as the club members and their guests, had no right to enter the strip (also called the shore or the foreshore) for any purpose. On the other hand, the court sustained the club's assertion that an 1888 Virginia statute prohibited the commonwealth from granting the Hog Island marshland in question to private individuals. The statute was designed to protect state-owned



marshes which had been "used as a common" by the people of Virginia from being granted to private parties and thus removed from the public domain.

The Federal case was appealed to the United States Court of Appeals for the Fourth Circuit. That court stayed further proceedings when it became aware that a similar case involving the Nature Conservancy was being considered by the Virginia state courts. The Federal courts normally defer to state court decisions when questions of state property law are at issue. Because no definitive Virginia decision exists on these issues, the Fourth Circuit Court decided to await the ultimate decision of the Virginia Supreme Court.

THE STATE DECISION

Shortly after suit was brought in Federal court, the Nature Conservancy found itself involved in another suit initiated in Virginia circuit court. In this case, *Bradford v. Nature Conservancy,* however, the Nature Conservancy was the defendant. The plaintiffs were other owners of land on uninhabited Hog Island, residents of the eastern shore, and the commonwealth of Virginia. The plaintiffs asked for a declaratory judgment that the disputed shore lands and wetlands were owned still by the commonwealth in trust for the public or, if privately owned, impressed with a use easement in favor of the public.

Disagreeing substantially with the decision of the Federal district court, the Viriginia circuit court by and large gave the plaintiffs the remedy that they desired. The most significant portions of the decision concern the Atlantic shore lands and the bay side marshlands, both of which were held to be open for public use.

With respect to the Atlantic tideland, the court examined an 1873 Virginia statute which restricted the granting of certain submerged and coastal lands:

> **All the beds of the bays, rivers, and creeks, and the shores of the sea within the jurisdiction of this commonwealth, and not conveyed by special grant or compact according to law, shall continue and remain the property of the commonwealth of Virginia, and may be used as a common by all the people of the state for the purpose of fishing and fowling, and of taking and catching oysters and other shell fish. . . . Va. Code ch. 62, §1 (1873).**

According to the state court, the statutory prohibition was explicit: none of the lands described, including the Atlantic intertidal strip, that is, "the shores of the sea," was to be granted by the commonwealth to private or other public bodies unless by a special action of the legislature. In addition, these lands were to be open to the public for the traditional purposes of fishing and hunting. On this issue the state court disagreed entirely with the Federal court, which had said that the 1873 statute did not prohibit grants of shore lands and submerged lands. The Federal court interpreted the statute as stating merely that ungranted lands were to be commonwealth property so long as they remained ungranted, and while ungranted these lands were to be available for public activities. Nothing in the 1873 statute, according to the Federal court, prevented the commonwealth from lawfully granting coastal areas and waterway beds to private individuals.

The 1873 statute, insofar as it prohibited grants of Atlantic shore lands, could operate prospectively only. The statute has been reenacted in subsequent Virginia codes and continues in effect today. Because the Virginia circuit court decided that the 1873 statute prevented grants only after the year of its enactment, it had to determine when the original grant of the disputed beach was made by Virginia to the Nature Conservancy's predecessor in title. The conservancy could trace title to some of its Atlantic coast property to a grant before 1873 and some to grants after 1873. As to the latter property, the court held unequivocally that the conservancy's title extended only to ordinary high watermark and that the intertidal strip remained state property open to public use.

A longtime Chesapeake Bay resident pulls a crab pot out of the water. Bay residents count on free access to the tidal waters for crabbing, clamming, and oystering.
(Photos by the author)

The famous Chesapeake Bay blue crab is prized by commercial and amateur fishermen for its succulence and flavor.

Holding pens for peeler crabs are kept near the shore rather than out in the bay. The crabs are stored here until they shed their shells and then are cooked immediately.

In deciding the fate of the property granted by the commonwealth before 1873, the court could not rely upon the 1873 statute and looked instead to an 1819 statute, which extended the boundaries of waterfront lands to ordinary low watermark. This statute modified the Viriginia common law view, which had been adopted from England, that the grant of shoreline property normally gave title only down to the high watermark; the land seaward of high watermark remained in the hands of the crown and later the commonwealth. At the same time that the statute extended shoreline boundaries to low watermark, it stated that the public was still allowed to hunt, fish, and fowl on the shore lands, "which are now used as a common to all the good people."

Under this statute the seaward boundary of the conservancy's Atlantic shore property granted before 1873 was held to be ordinary low watermark. The court, however, apparently found that the shore lands at that point had been used as a commons by the citizens of Virginia even before the first permanent settlement on Hog Island shortly after the Revolutionary War. The only evidence supporting that conclusion was the testimony of former Hog Island residents and frequent visitors who recounted the long tradition of common usage of the Atlantic shore by themselves and their ancestors. The court found this evidence sufficient to fulfill the statutory standard. Therefore, although the conservancy's title extended through the intertidal strip to low watermark, the public still enjoyed the privilege of using the intertidal strip for fishing, fowling, and hunting.

Ultimately then, no matter when in the nineteenth century the commonwealth granted the shore lands to the conservancy's predecessor in title, the public is still able to use those areas as a common. The most significant aspect of the court's discussion is its reliance upon the oral history of Hog Island to establish ancient common usage. Before this decision it was thought that some more concrete evidence of continuous public use or of commons designation would be necessary to establish that tidelands had been "used as a common" within the meaning of the 1819 statute. In fact, under the English tradition of common lands, which had been carried over to colonial Virginia, common areas were normally set aside specially and designated as such in the towns or on the manorial estates.

The court's holding with respect to the marshlands on the western side of Hog Island is even more startling than its disposition of the Atlantic shore issue. An 1888 Virginia statute prohibited the granting by the commonwealth of certain unappropriated marshlands. This statute restricts grants of marshlands that fulfill three conditions: they are located on Virginia's eastern shore; they have not yet been granted by the commonwealth; and they have been used as a common by the public.

Because the Nature Conservancy claimed marshlands granted originally by the commonwealth in 1901 and 1915, the state court had to decide whether the 1888 statute applied to those grants. In a curious bit of statutory interpretation the court in effect compressed the three legislative requirements into two. It was clear from the evidence that the Hog Island marshlands were situated on the eastern shore and that they were ungranted in 1888. As to the third requirement, that the marshlands have been used as a common, the court accepted plain-

tiff's contention that the legislature was recognizing in 1888 that all unappropriated marshlands had been so used. In other words, all eastern shore marsh and meadowlands not yet granted by 1888 were exempt from grant after that date, whether or not any specific evidence showing their prior use as a common could be found.

Thus the state court, by framing its decision in this way, reinforced the common lands tradition in Virginia. By removing the necessity of showing commons usage in 1888, the court recognized implicitly that as time passes it will become increasingly difficult for the public and the state to establish that eastern shore marshlands were common areas used by the people for fishing and fowling in the nineteenth century. In the *Bradford* case itself, testimony of longtime Hog Island watermen and sportsmen that they, their fathers, and their grandfathers had often fished and boated in the western marshes bolstered the court's decision to invoke the 1888 statute. But this type of evidence necessarily will disappear as this generation of watermen passes. The court's holding therefore preserves for the public thousands of acres of marsh and meadowlands on Virginia's Atlantic barrier islands and the eastern shore peninsula.

The *Bradford* case, like the earlier Federal court decision, has been appealed, and the Viriginia Supreme Court is expected to render a final decision in the spring of 1982. If that court affirms the lower court's determination, private development and private conservation efforts on much of Virginia's coastal area will be halted. The public's right to use these areas for recreational and commercial activities will prevent both the filling in of shore lands and marshlands as a prelude to private development and also their private preservation as unspoiled natural habitats for the rich variety of estuarine species. A decision reaffirming Virginia's long tradition of common lands will underscore the policy of setting aside certain unique and valuable natural resources for perpetual public use as against what are perceived to be the narrower interests of a few private individuals. ■

The bay watermen frequently must repair their crab pots, which deteriorate in the salt water.

Waterfront residents commonly use the tidal foreshore to construct docks for their pleasure craft. Such docks cannot impede the public's right of navigation on the Chesapeake Bay and its tributaries.

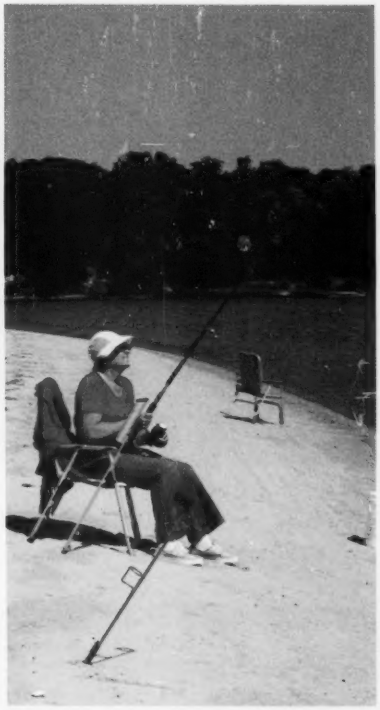
PART II: LEGAL THEORIES IN OTHER COASTAL STATES

Virginia is somewhat unusual in having such an elaborate statutory scheme developed over the course of a century that regulates disposition of shoreline and submerged lands. Other coastal states faced in recent years with conflicts over public and private uses of waterfront areas have turned to non-statutory, common law theories developed by the courts to resolve these conflicts. A brief review of three of the most prevalent common law theories places the Virginia decisions in a broader context and reveals the basic compatibility of Virginia's view with the views of other coastal states.

CUSTOM

A few states in preserving the right of public access to beaches have relied upon the English common law notion of custom. The doctrine of custom, while similar to the concept of common lands, developed separately from it. To establish a customary right in the inhabitants of a town or a county or in the public at large, one must show that the right has been exercised without interruption since antiquity, peaceably and reasonably. The customary right must also be certain, obligatory on the private landowner, and consistent with other customs and laws.

Like the common lands doctrine then, custom requires evidence of ancient, fairly continous public use. In fact, the necessity of antiquity has caused some courts to find this theory inapplicable in the United States. Antiquity under English law was defined as the "time whereof the memory of man runneth not to the contrary," a phrase understood to refer to a usage begun before the coronation of Richard I in 1189. Applying this definition literally, some courts have held that custom can never be used as the basis for establishing public rights in this country because the European settlement of America did not occur until several centuries later.



Despite the superficial logic of the argument rejecting custom, the Oregon Supreme Court in 1969 revitalized this venerable doctrine and used it to allow public access for recreational purposes to the dry-sand area along the Pacific Ocean between the vegetation line and mean high watermark. In *State ex rel. Thornton v. Hay* (1969), the court found that the public long had assumed that the beaches were freely available for picnicking, gathering wood, and building warming fires. No private upland owner could possibly have been misled into thinking that the public could be excluded from the dry-sand area. Although the court admitted that American political and legal institutions are relatively young, it did not find that fact sufficient to discount the validity of a custom that existed even before the first European settlers reached the west coast.

The doctrine of custom, as used by the Oregon Supreme Court, resulted in the entire waterfront region being made accessible to the public. The court in *Thornton* stated that its conclusions regarding the customary usage of the dry-sand area applied to the entire Oregon Pacific coast. The breadth of this doctrine thus makes it a powerful legal tool for preserving public beach access. In contrast, the common lands doctrine in Virginia by and large affects only selected coastal tracts that were used as a commons by the people.

IMPLIED DEDICATION

The theory of implied dedication has provided the legal mechanism in some states for the creation or maintenance of public access to shoreline areas. Like the other two theories, it requires a showing of substantial public use of the disputed area. As interpreted by the California Supreme Court, however, the doctrine does not necessitate public usage since time immemorial or even since the nineteenth century. If the other requisites are met, a period of as little as five years may be sufficient to establish an implied dedication.

A landowner "dedicates" his land to the public when he intends to relinquish his private ownership rights over it and to transfer it to the public domain. Acceptance by the public, through either public use or acts of public officials, is necessary to complete the dedication. Dedication can be express, as where the landowner in the plat of survey of his land designates land specifically as dedicated for a public park. But more often in the beach access cases members of the public assert that a landowner by implication dedicated his land to the public. In such cases intent to dedicate is inferred from long acquiescence in notorious public use, and acceptance by the public is inferred from continuous and substantial public use.

In California the period of time for which uninterrupted public use must be shown to establish an implied dedication is only five years. In *Gion v. City of Santa Cruz* (1970), members of the public since at least 1900 had parked vehicles on the plaintiff's oceanfront property and proceeded across it to the sea to fish, swim, and picnic. Although the property owners occasionally posted "no trespassing" signs, these were quickly torn down, and the court found that such signs were not sufficient opposition to public use to defeat the implied dedication. The public, the evidence showed, had used the beach for more than five years with the owner's full knowledge and without his express permission. Hence th landowner lost the right to exclude the public by his passive acquiescence in the public's presence on his land.

For beachfront property owners, decisions like *Gion* mean that they must keep an ever watchful eye on their shoreline lands. Neglect for five years or perhaps even less may result in a permanent public easement on their property. Members of the public, on the other hand, find an easier path to establishing beach access in the implied dedication theory than in either the common lands or custom doctrine. The California theory obviates the need to comb the memories of aged coastal residents for recollection of ancient public usage.

TOP: The low salt marshes on Assateague Island, part of Virginia's eastern shore, are similar to the marshes on Hog Island, which is accessible only by boat. These marshes serve as the nesting ground for numerous species of wildfowl.

CENTER: This view from Virginia's eastern shore shows Hog Island in the distance. The Atlantic barrier islands separate the ocean from small bays along the peninsula.

BOTTOM: This swan represents just one of the many species of wildfowl that live on the eastern shore or use it as a resting place on their fall and spring migrations.

THE PUBLIC TRUST

A third common law theory that promotes the public's interest in waterfront areas, the public trust doctrine, focuses on the concept of the state as a trustee for its citizens. Under this theory the state owns certain irreplaceable, invaluable lands as a trustee for the public. Typically, the intertidal strip and the beds of navigable waterways are considered to be among the lands so owned.

Although the states have varied in their interpretation of the state's trust responsibilities, all are agreed that the state cannot convey trust properties to private individuals such that the public interest in the remaining trust properties is substantially impaired. For example, the state could not convey the bed of a navigable river to a private company whose proposed gravel mining operation would block public passage over the river. Some courts have gone even so far as to suggest that the state cannot alienate lands subject to the public trust except when the grant would specifically promote the public interest—for instance, when the private grantee intends to build a public wharf or public park.

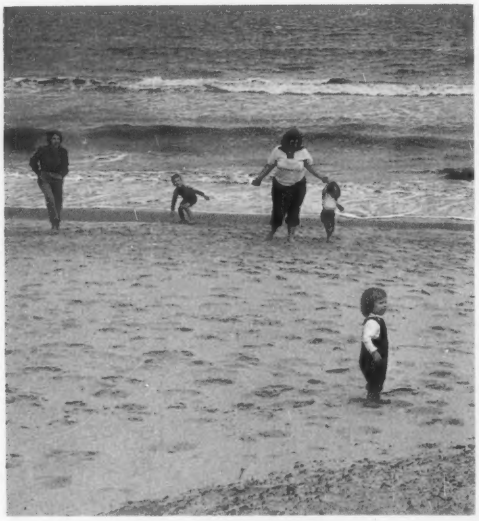
The New Jersey Supreme Court has applied the public trust doctrine to protect public access not only to the ocean foreshore but to the upland dry-sand area as well. In *Borough of Neptune City v. Borough of Avon-by-the-Sea* (1972), a municipality owned the dry-sand area above mean high watermark along a stretch of the Atlantic Ocean and ran the area as a public beach. One year it began to charge fees for the use of the beach; it charged higher fees to non-resident users than to resident users. The court held that the municipality could not discriminate in this way between residents and non-residents.

After examining the historical roots of the public trust doctrine as a device for protecting the public's rights to fish and navigate on tidal waterways and lands, the court stated that the doctrine should be expanded to encompass modern public recreational uses as well, including sailing, swimming, and skating. Because the state-owned foreshore was held in trust for these uses, the municipality, a political subdivision of the state, could not regulate the dry-sand area above the foreshore so as to diminish the accessibility of the foreshore to all citizens. Beach users necessarily had to walk across the dry-sand area to reach the foreshore and the sea. The public trust doctrine dictates that these trust properties be open to all on equal terms. The discriminatory fee schedule had the effect of making these areas less accessible to users not residing in the municipality and therefore was invalid.

The holding of *Neptune City* seems

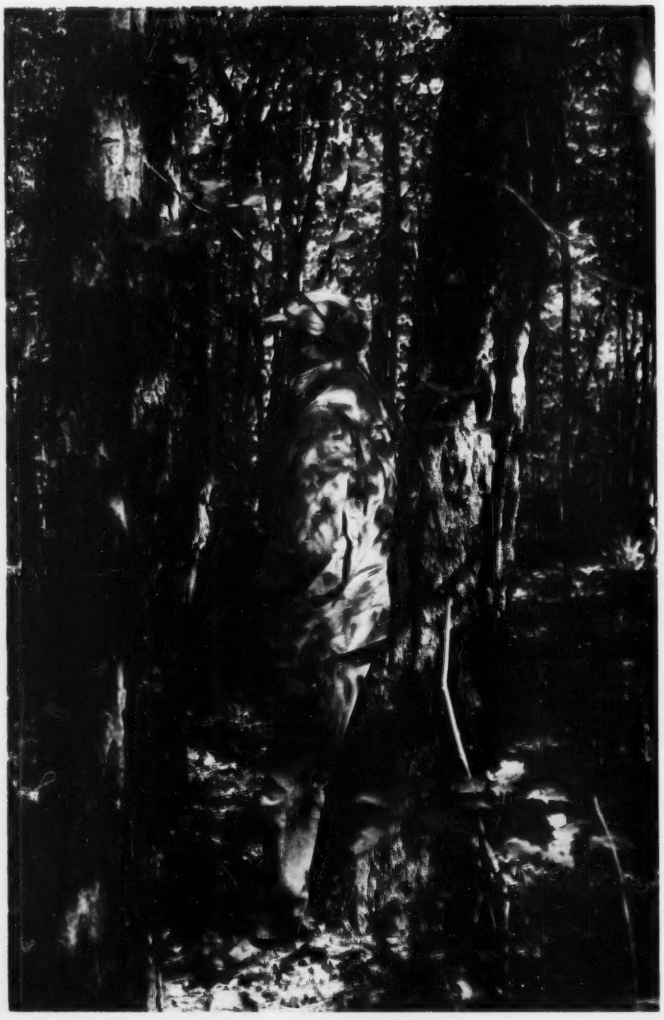
Sportsmen are allowed to erect duck blinds in Virginia's tidal rivers, popular spots for wildfowl hunting.

The wild ponies of Chincoteague on Virginia's eastern shore are famous for their annual summer swim across Assateague Channel from Assateague Island to Chincoteague Island.



At all seasons of the year tourists and Virginia residents stroll the shores of Virginia Beach, one of the state's most popular Atlantic coast resort spots. Boating, swimming, and wading provide an escape from the heat of the Virginia summer.

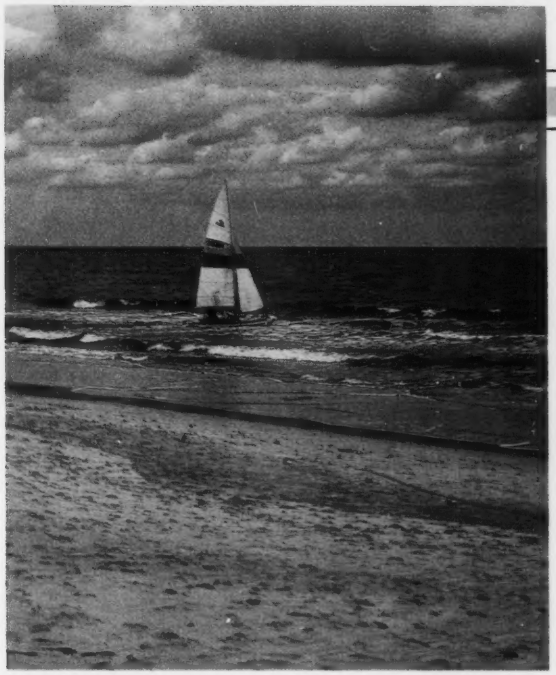
Hunting of wildfowl and other animals is a popular recreational use of Virginia's riverfront wetlands and forests.



fairly narrow—that is, a municipality, county, or other local governmental body cannot charge discriminatory fees for use of a beach dedicated as a public park. There is, however, language in the case that suggests a much broader view of the public trust doctrine as an ultimate restriction on the state's ability to dispose of shoreline lands. Where the state owns the foreshore and the adjacent dry-sand area, it may be prohibited from granting these lands to private parties for purposes inconsistent with public recreational use. If the foreshore is granted to a private individual, the grant necessarily carries with it a use easement in the public. Like the other theories discussed, the public trust doctrine serves to impress certain privately-owned coastal lands with a public right of access.

CONCLUSION

The Virginia common lands doctrine and the other legal theories of custom, implied dedication, and the public trust have been used in the last decade to prevent erosion of public rights in tidelands. The prevailing view has been that the narrower interests of private



TOP LEFT: This particular area in Virginia Beach is publicly owned. Access to privately owned beaches will be affected by the ruling in the Bradford case.

TOP RIGHT: Wooded areas as well as marshes and beaches are common along Virginia's tidal rivers. In England and colonial America, forests were often set apart as common woods for the people to use for gathering firewood.

BOTTOM: Apart from the eastern shore, beach areas exist in Virginia along the tidal rivers. The sandy shore and the bluffs are typical sights along the James River, one of Virginia's four major tidal rivers.

developers should not be allowed to take precedence over the broader public interest in this valuable resource. The recent Virginia cases involving the Nature Conservancy have brought a new player into the scene—a group that aims to preserve coastal wetlands and dunes in the "public interest." The decision of the Virginia state court, however, reaffirms the preeminent goal of public access and use as against the desires of any one segment of society, no matter how laudable its goals. For example, if natural habitat is to be conserved and hunting restricted on these lands, it must be done through state regulation rather than private fiat. The Virginia lower court decision stands in line with the judicial approach taken in Oregon, California, New Jersey, and other coastal states. It remains to be seen whether the Virginia Supreme Court will sustain this approach or will strike the balance among the competing interests in a different way. ■

Acknowledgments: The author gratefully acknowledges the helpful editorial suggestions of Professors Charles H. Koch, Jr., Marshall-Wythe School of Law, College of William and Mary, and Ray J. Grzebielski, DePaul University College of Law.

China Journal

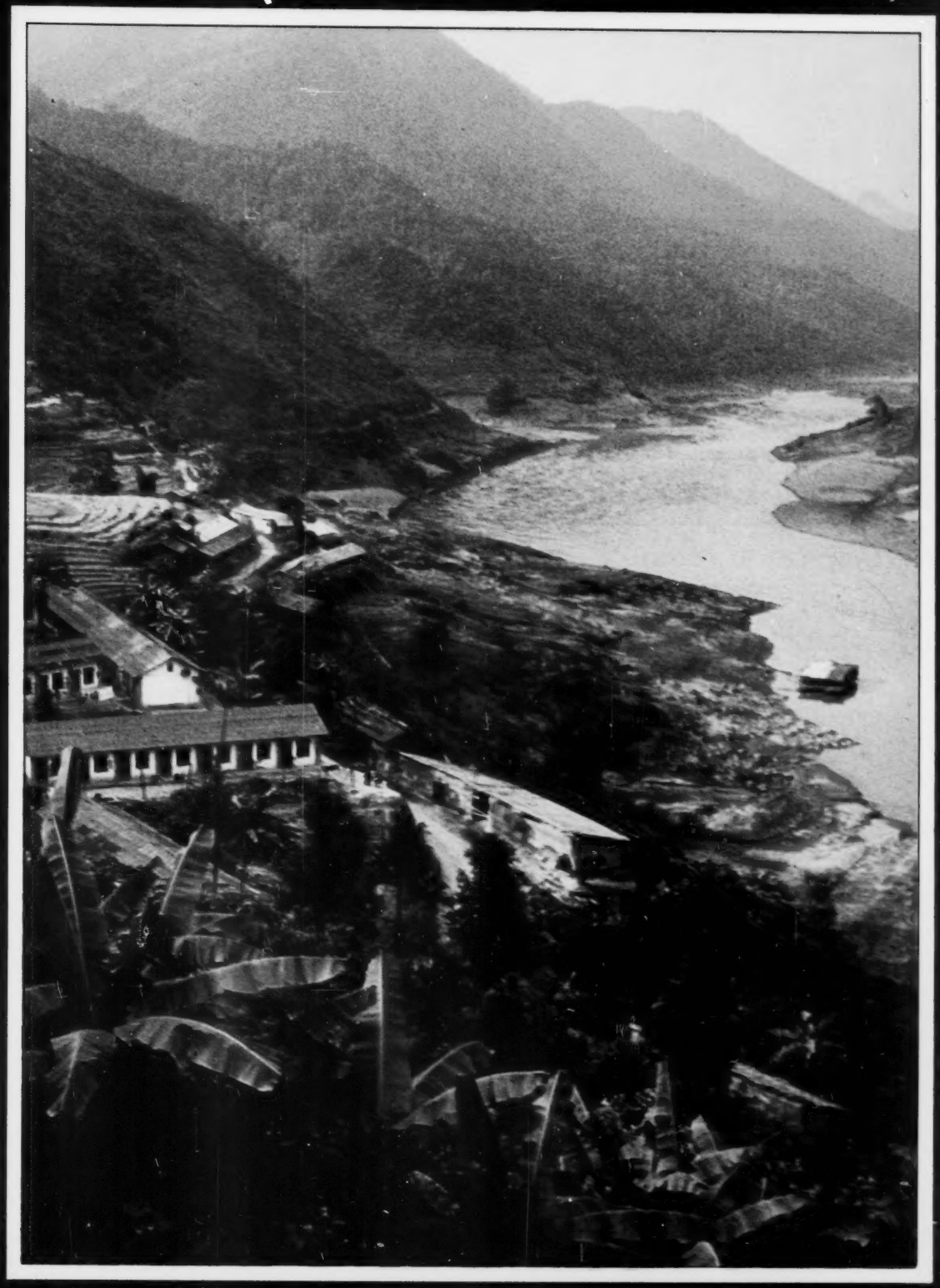
THE LONGTAN PROJECT

by Richard W. Galster and Edward C. Pritchett

Editor's note: The Spring 1981 issue of Water Spectrum *featured an article ("China Journal") on the first U.S. Army Corps of Engineers' delegation to visit the People's Republic of China, in October 1980, under the terms of the Mondale Protocol to the 1979 Science and Technology Agreement. That delegation was concerned with river regulation and navigation improvement in the Yangtze River Estuary.*

The second Corps delegation visited the People's Republic of China in November and December of that year to review the design of the Longtan Dam located on the Hongshui River in the Guangxi Province of south-central China. This group of engineers from the Corps' North Pacific Division included Edward C. Pritchett (team leader), John G. Oliver, Kenneth J. Laumand, and Richard L. Mittelstadt from division headquarters; Eugene L. McCoy and Vincent H. Steinkamp from Portland District; Gerrett L. Johnson, Richard W. Galster, and Richard P. Regan from Seattle District; and Glen R. Moosman and William E. Branch from Walla Walla District. The following article is an account of that visit.

Mr. Galster is chief of the Geology Section at the U.S. Army Corps of Engineers' Seattle District, Seattle, Washington 98124. Mr. Pritchett is chief of the Geotechnical Branch in the Civil Works Directorate, Office of the Chief of Engineers, Washington, D.C. 20314.



BEIJING

DAY 1

The Corps team arrived in Beijing at 1300 after a smooth trip from Tokyo past Mt. Fuji, across the East China Sea, over Shanghai and north to Beijing. Much of north China was covered by a thick haze. The group was met by Madam Zhu Yunpei and Messrs. Chou Yuekuan and Ren Chinghu, all from the Ministry of Electric Power. A trade fair was straining the city's tourist accommodations, so we were billeted on the northeast side of the city in the prefabricated Yan Xiang Hotel, which had been open only a few days.

DAY 2

At the Ministry of Electric Power, the team was briefed on the Longtan project, its general features and importance. Mr. Jia Ke of the ministry's Foreign Affairs Division chaired the meeting, with Madam Liu Waiyun interpreting. The team viewed two films, one on a relatively modern mass concrete conveyer and batching system at the Wujiangdu hydro project recently under construction and the other on a reservoir lake tap to provide additional spilling capacity. We spent the evening at the famous Peking Duck restaurant, where Vice Minister Li E Ding hosted a formal reception and banquet—a lavish affair of some 30 courses.

DAY 3

Sunday, 16 November, was a sightseeing day. We were driven 60 kilometers north to the hills of Jundu Shan, past great limestone quarries which furnish much of Beijing's building materials. The North China Plain was largely cultivated with winter crops shielded from expected icy winds by a variety of shrouds. We inspected the Great Wall at Juyangguan, then continued to the Shisanling Valley past a large flood control reservoir and the great stone animals that guard the entrance to the tombs of the Ming Dynasty emperors. We returned to Beijing to board the night train for the 2640-kilometer trip to Nanning in south-central China.

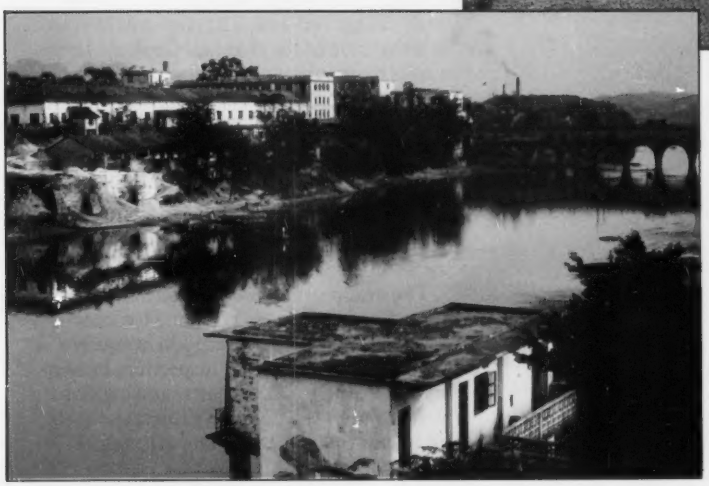
Yangtze farm north of Wuhan.

LONGTAN

DAYS 4-6

Daylight on Monday found us traversing the countryside between the Huang Ho (Yellow River) and the Yangtze, and Tuesday morning provided our first view of the great karst mountains and the thick subtropics of the Guangxi Autonomous Region. From Nanning we went by minibus northward through the sparsely timbered hills of Daming Shan, crossing the Hongshui Ho (Red Water River) late in the afternoon. Harvest season was in progress. We noted the "slipform and pounded clay" method of house construction capped by heavy tile or light thatched roof. Wednesday's drive took us over the mountain passes of Duyang Shan and through karst valleys with peaks rising 1000 meters or more on either side. Some attempts at reforestation had been made. At one point the road passed through a natural cave beneath a high ridge. The populace had created terraces in the thick residuum for building dwellings and growing crops in the mountainous terrain. The team arrived at the Longtan project site after dark.

Grazing water buffalo, central Guangxi Autonomous Region.
(Photos by Richard W. Galster)



Pounded clay and tile roof construction northeast of Nanning.

DAY 7

Longtan camp was a series of narrow, one-story concrete and plaster structures built on a steep, artificially terraced slope. In the morning the team was briefed by Mr. Liu Guoling (project geologist) with excellent translation by Mr. Zhang Wenzheng. Mr. Liu thoroughly covered work accomplished to date on geology, foundation conditions, reservoir leakage, rock mechanics tests, and four sites considered. In the afternoon we looked at three of the dam sites being considered.

Longtan camp.

DAYS 8-10

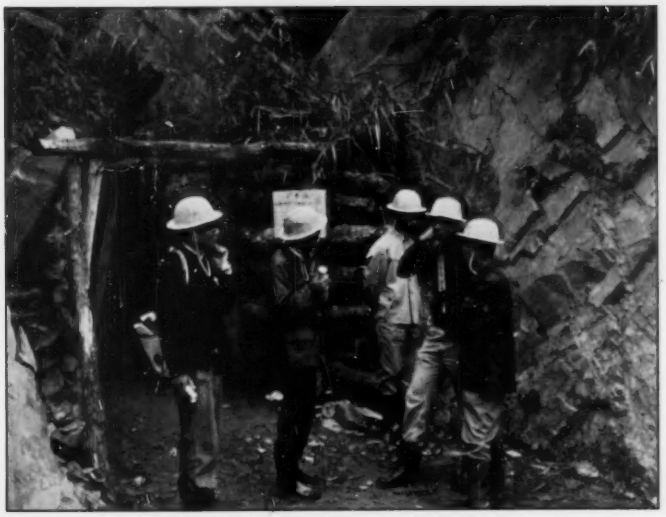
On November 21 the team examined several adits on the right bank at the Longtan site and bedrock exposures along the narrow valley floor. Hongshui Ho is a high discharge, low gradient, low velocity stream exhibiting stage change on the order of 25 meters, a heavy suspended load, and a small caliber bedload. The river was low, so bedrock could be seen on either side of the channel. Geologic structure was well exposed in adits to permit good correlation with surface exposures in the valley bottom. The team was impressed with the amount of geological work accomplished and the size of the force gathering geologic data. Field presentations were well planned and executed, with various geologic structures marked on adit walls and various rock units identified in surface and subsurface exposures. We inspected the proposed location of a quarry for concrete aggregate or rockfill design schemes. The area was a beautiful mountain valley which would satisfy requirements for a national park in the U.S. The next morning we inspected several adits on the left side of the valley at Longtan. We came back to camp downriver by work boat and spent the afternoon in conference with the staff discussing and clarifying our inspection, answering questions proposed by our Chinese counterparts, and making suggestions on further work. We left the Longtan project site early on November 23 for the long bus trek back to Duan, arriving at dusk.

DAY 11

DUAN

The Corps team visited the Da Hua project presently under construction on the Hongshui Ho southwest of Duan. This will be a concrete structure 85 meters high with a concrete spillway, non-overflow and intake sections, flanking embankments, and a 250-metric ton capacity ship lift. The flanks of the structure were well toward completion, and foundation cleanup was in progress in the central section. Here each of some 2000 workers carried two muck baskets, or "quings," suspended on either end of a bamboo pole (28 kilograms per load). A visit to Yiling cave topped off the day. Yiling is a beautiful limestone cave where strange likenesses and stories are related to various formations. We left Duan at 2130 on the night train north.

Foundation preparation at Da Hua Dam on the Hongshui Ho.



Galster and Liu (with interpreters) discuss adits at Longtan Dam site.

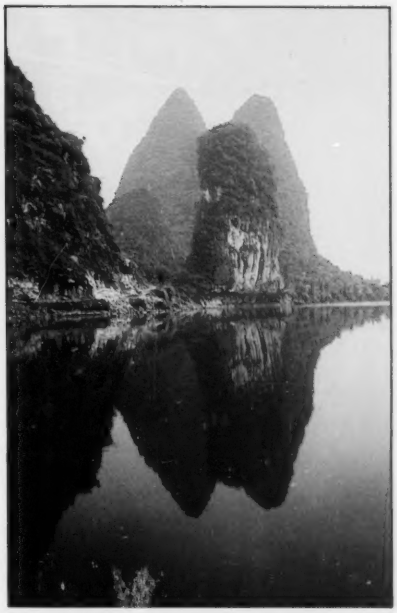
GUILIN

DAYS 12-13

At 0615 the team disembarked in Guilin, a city built within and surrounded by many sharp, steep-sided karst peaks riddled with caves. As the operating base for the famed "Flying Tigers" during World War II, it was heavily bombed; the city simply lived underground in the caves during this period. The day was spent climbing stairways up hills and descending into two of the many caves. Next day we traveled by bus about 30 kilometers downstream to Yang Ki for a boat tour of the Lijiang. The river was very low, and the ensuing 3½-hour trip down to Yang Shuo was made in a craft not too dissimilar from the *African Queen.* Seas of karst moutains rose in all directions. We were bused back to Guilin, and at 2000 caught the night train to Changsha.

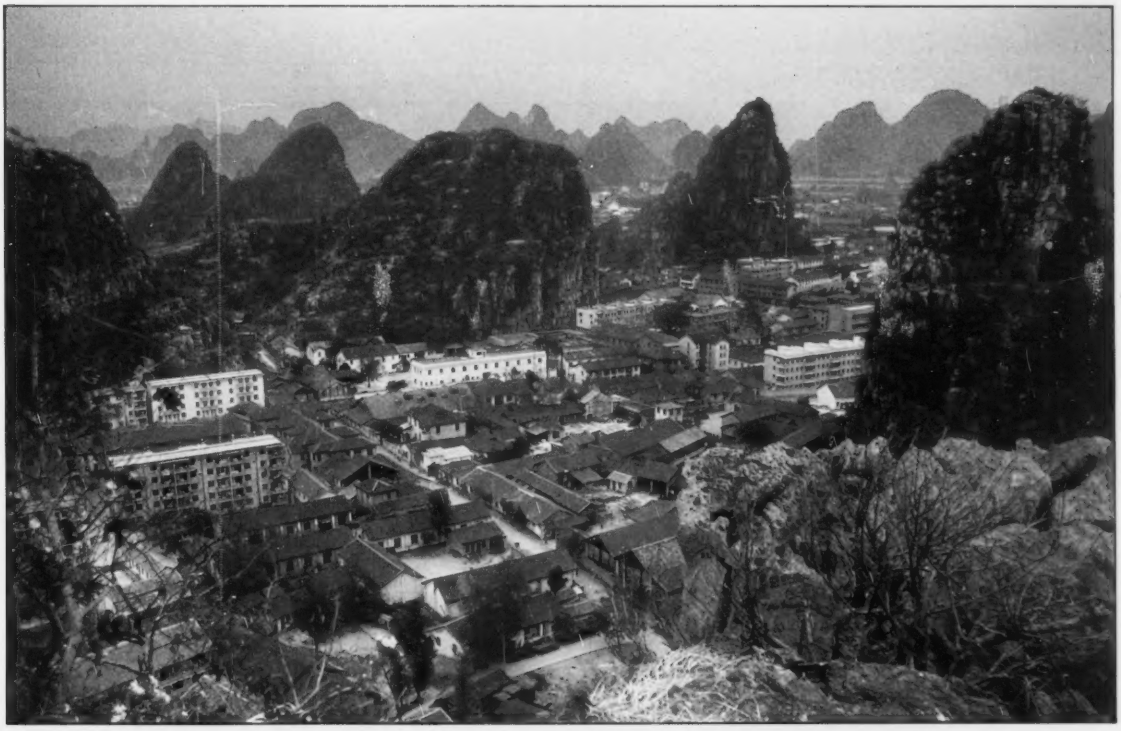
Zhejiang ferry.

Karst mountains, Lijiang.



Machun Gorge on the Hongshui Ho.

Karst mountains, Guilin.



CHANGSHA

DAY 14

Thanksgiving Day. Immediately upon leaving the train in the spacious station at Changsha the Corps team was met by a delegation from the South-Central China Survey and Design Institute. We met shortly at the Xiangjiang (Xiang River) Hotel in downtown Changsha, where—after 11 days—we caught up to our luggage. This was to be our home and conference center for the next 13 days. The afternoon was spent making introductions, having tea, and listening to formal presentations on the Longtan project hydrology. The evening meal was a formal banquet hosted by Mr. Hsu Chenkuo, director of the institute.

Longtan project geology staff, Changsha.

Xiangjiang riverfront, Changsha.

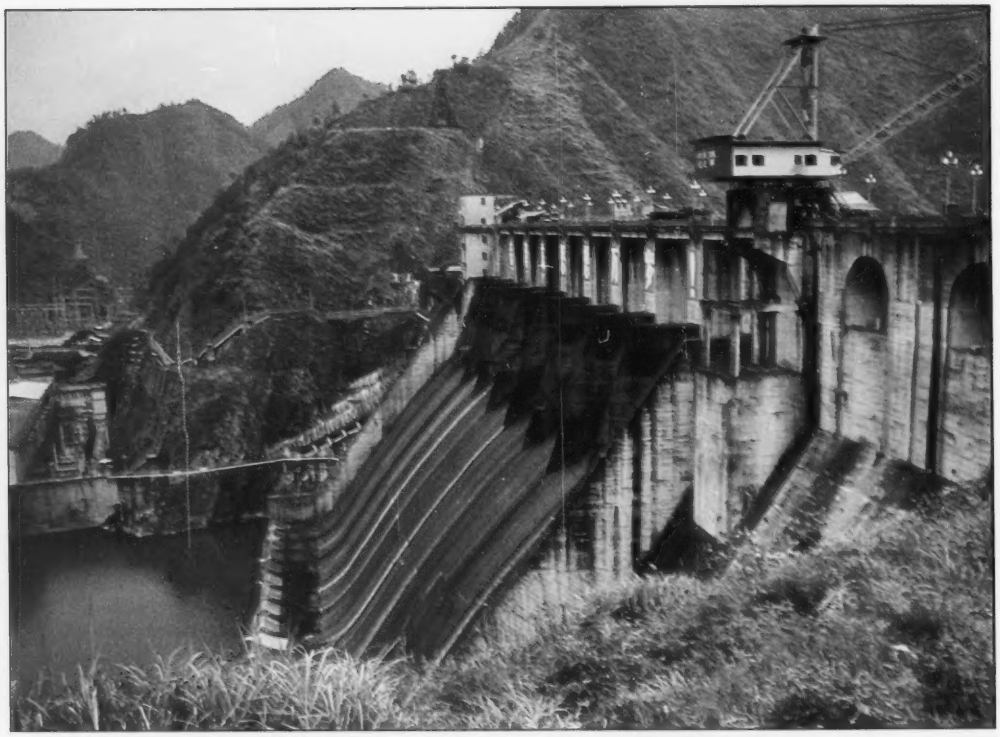
Street scene, Changsha, Hunan.

DAYS 15-20

The Chinese made formal presentations on Longtan project planning, design, and construction, including proposed layouts. At the request of the institute, the Corps team presented a series of lectures. Talks were given on the history and organization of the Corps, hydro development of the Columbia River, and construction practices in United States. Working groups engaged in detailed discussion of the Longtan project; geotechnical, hydrology, and power planning; hydraulics/structures; and construction/estimating. Our appreciation grew for the effort and concern of our Changsha colleagues regarding the Longtan project. Two hours of free time at midday and some evening time permitted us to walk about the city on our own each day to get a feel for urban life in China. Because most day-to-day commercial activity takes place along the street (weather permitting), mixing with and learning from people was simple in spite of the language barrier. It was commonplace to be approached and asked, "May I speak with you?" Under such circumstances, a crowd would soon gather to observe the session. We soon accustomed ourselves to various vehicles, crowded streets and sidewalks, and constant honking of vehicle horns.

DAYS 21-22

The Corps staff caucussed to "brainstorm" recommendations regarding the Longtan project. The continuing caucus brought forward alternate suggested layouts for both concrete gravity and embankment schemes.



Zhexi Dam, Zhejiang, Hunan.

DAYS 23-24

The Corps team left the city by minibus and drove through the hill country of central Hunan Province, through extensive tea "plantations," arriving at the Zhexi Hydroelectric Station, a distance of 250 kilometers from Changsha, about 1300. Zhexi, on the Zijiang (Zi River), is a 104-meter-high concrete buttress/hollow gravity dam having a crest length of 326 meters with a six-unit powerhouse and 50-ton capacity ship lift. Dam construction was completed in 1961. The team was briefed on the project, then toured the entire facility which provided an interesting comparison with construction of the same vintage in North America. We stayed overnight at the camp guest house after an excellent dinner and an evening of discussion and television (U.S. show with spoken Chinese). We returned to Changsha the next day.

DAYS 25-26

The Corps visitors delivered a series of lectures on technical topics requested by the institute. To the general group assembled, lectures were on design of high concrete dams; design criteria and testing practice for high velocity flows; high lift locks; design and construction of high embankment dams; and investigation, design, and construction of surface and underground excavations. In the evening the entire institute enjoyed a slide presentation on the scenic wonders of Washington State. Second day lectures were presented in various working groups on economic calculations of flood control; determining installed capacity, single unit capacity, and design head; powerhouse layout arrangement; project seismic studies and evaluation of rock mass properties; testing techiques for weathered rock materials; laboratory soils testing techniques; cost estimating of hydropower construction; and hydraulics of low head powerhouse/spillway structures. All lectures were well received and sparked a host of questions and interesting and worthwhile discussion periods.

Ship lift, Zhexi Dam.

DAY 27

The Corps team presented recommendations and suggestions to the Changsha Institute staff on the Longtan project, keeping in mind guidelines indicated by the institute director Mr. Hsu upon our arrival in Changsha—to assist in the selection of the best possible site, to make the best use of the site by providing soundly engineered layout, and to use the most advanced design and construction techniques, all these factors resulting in the least possible investment in money and construction time. Corps recommendations were well received, with the thanks of the institute. We bid goodbye to our Changsha colleagues during the evening.

Geology staff presents results of site mapping studies and shows exploration equipment in use.

Team leader Pritchett presents Corps recommendations to Vice Minister Li Rui, Ministry of Electric Power.

BEIJING

DAY 28

The Corps team departed Changsha shortly after noon and flew to Beijing, there billeted in the famous Peking Hotel. It was minus 20 degrees Celsius in Beijing with a skiff of snow on the ground.

Courtyard of Supreme Harmony, Forbidden City, Beijing.

DAY 29

Formal meetings took place in the morning at the Ministry of Electric Power with Vice Minister Li Rui. The Corps team leader summarized recommendations. Mr. Li welcomed the recommendations and indicated that the Chinese had only about 30 years experience in building hydroelectric projects, 10 years of which was during the Cultural Revolution amidst a lot of sabotage to their work. After lunch, we visited the Forbidden City (Palace Museum). The day was clear, sunny and cold. To walk among these ornate fourteenth century structures, now nearly all restored, and to realize the thousands of man-days involved in their construction was to understand the great contrast between ancient and modern China. In the evening we were treated to a live acrobatic show at a theater in downtown Beijing. The show was an amazing display of physical talent the like of which none of the team had ever seen.

DAY 30

After visiting the Summer Palace and the Forbidden City, the Corps team departed for the United States. ■

short take

WORLD UNDERWATER FEDERATION

by John C. Fine

The Executive Bureau was grouped around a rectangular table. Representatives from different nations listened through earphones to simultaneous translation of the proceedings. Outside, member nations met separately or in small groups after voting intervals when the proceedings were tabled. A meeting of a subcommittee of the United Nations?

The impression of a U.N. confab wouldn't be too far off. The delegates represented at this Paris meeting, however, were representatives of national diving federations from around the world, and the meeting was to set the agenda for the Seventh World Congress in Cancun, Mexico.

The Confederation Mondaile des Activities Subaquatiques (CMAS), or World Underwater Federation, is not a new organization. It was founded on January 10, 1959, in Monaco, spearheaded by Jacques Yves Cousteau and Jacques Dumas. The federation has grown to include a membership roll of some 51 nations and about three million divers.

CMAS functions through its member nation participants, organizing world class diving events and championships, setting standards for diver training, and issuing international diver "passports" earned through a carefully studied equivalency rating system. The CMAS three-star rating system classifies and standardizes divers from different countries. Most important, CMAS fosters a dimension of international cooperation and understanding among divers worldwide, whether their pursuit is pure sport or serious academic ocean research.

While the men and women who make up CMAS's elected Executive Bureau have divergent backgrounds, through their voluntary efforts divers from as far away as Hong Kong can join with colleagues in Mexico to enjoy the benefits of the latest research in decompression diving and to compete for prizes in international ocean orienteering, fin swimming, or underwater photography.

Suddenly, faraway places that divers seek out for vacations take on special meaning. When persons of different national origin meet diving colleagues through the CMAS federation directory, a kinship of common interests often opens the door to lasting international friendships. While only national federations can actually "belong" to CMAS, individuals can receive cross certification by equivalency through their own certifying agency. Upon request from the national certifying agency, CMAS headquarters in Paris will issue an international equivalent certification card (in three languages) recognized and respected all over the world.

In the United States, divers are not represented or licensed by a governmental body or national federation per se. Aside from some commercial organizations, there are three main instructional agencies that issue diver certification cards. Two of these organizations, NAUI and the YMCA Underwater Activities Program, currently belong to CMAS and participate in the international certification program.

CMAS equivalency ratings use a three-star system to classify both divers and instructors. A one-star diver is least experienced; the three-star rating is the highest level. CMAS sponsors an international college of instructors which conducts training seminars and provides expertise to the diving community worldwide.

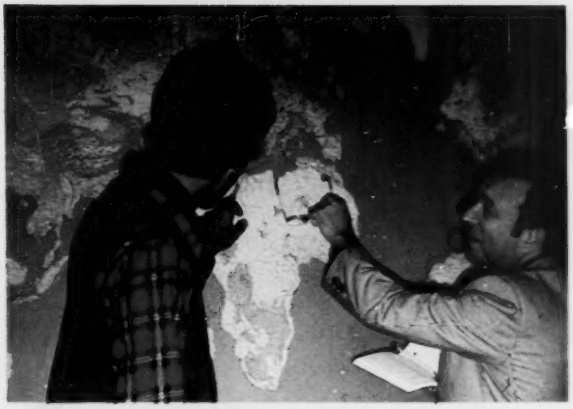
Mr. Fine is an attorney in Scarsdale, New York 10583.

For a number of years CMAS has proposed that the International Olympic Committee recognize fin swimming as part of the world games. Recent dialogue between CMAS and representatives of the Olympic Committee gives positive expectations that fin swimming and possibly underwater hockey competitions may finally become official olympic sports. CMAS recognized four competitive underwater sports: spearfishing, fin swimming, underwater orienteering, and underwater games.

CMAS has largely accomplished the goals set in 1959—to unify, coordinate and develop the underwater disciplines. Notables such as Lord Mountbatten, Prince Rainier, the King of Sweden, Prince Charles of England, and dozens of others have addressed CMAS World Congress meetings and taken part in CMAS activities. In a symbolic gesture at Genoa, Italy, in 1964, CMAS took possession of the seabed with Jacques Yves Cousteau reading the declaration. This declaration was later sealed in a bronze cylinder and dropped into the sea with the flags of member nations.

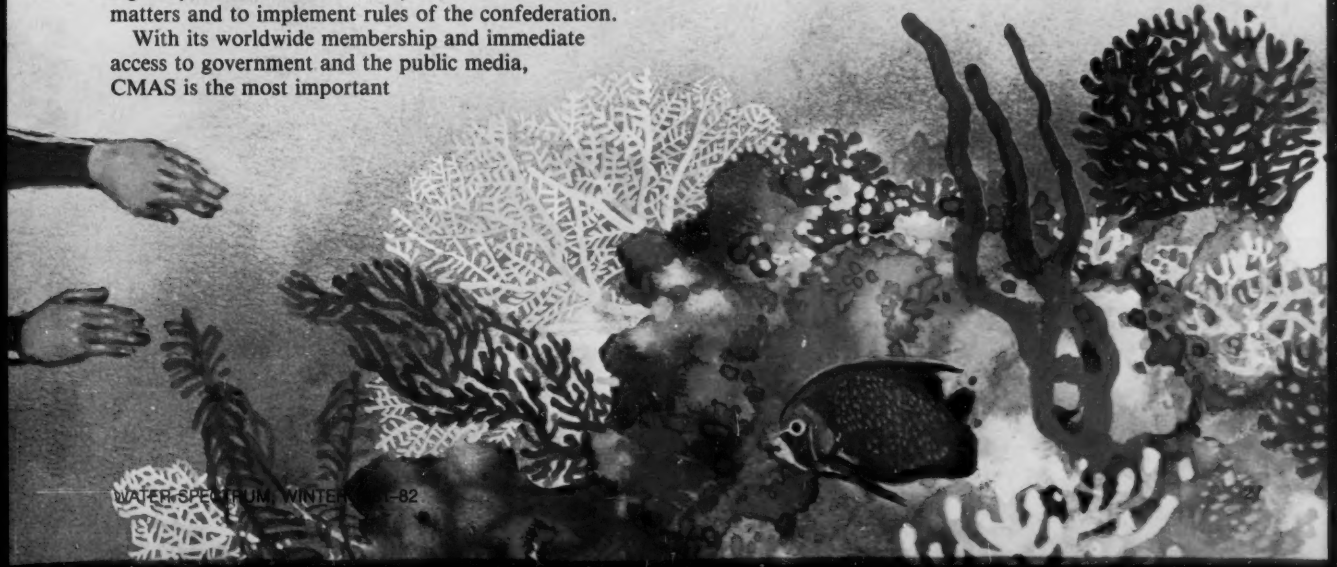
There are three committees of CMAS: Sports, which deals with underwater games and competitive activities; Technical, which deals with all noncompetitive aspects of diving; and Scientific, which deals with biological, oceanographic, archeological, and other scientific diving exploits. Each national diving organization can belong to each of the three committees. Only one organization per nation can belong to the Sports Committee. For the Technical and Scientific Committees, besides the national federations, diving organizations such as those concerned with instruction or scientific research can apply for affiliation so long as there is no veto by the national federation. Membership in CMAS, therefore, is applied on a committee membership basis. Applications for membership in any of the committees must be approved by the CMAS' elected Executive Bureau composed of delegates from all member national federations. Each of the three committees elects its own officers with each committee chairman being ex-officio vice-president of CMAS and a member of the Executive Bureau. The elected Executive Bureau members and committee chairman meet regularly, at least three times a year, to act on administrative matters and to implement rules of the confederation.

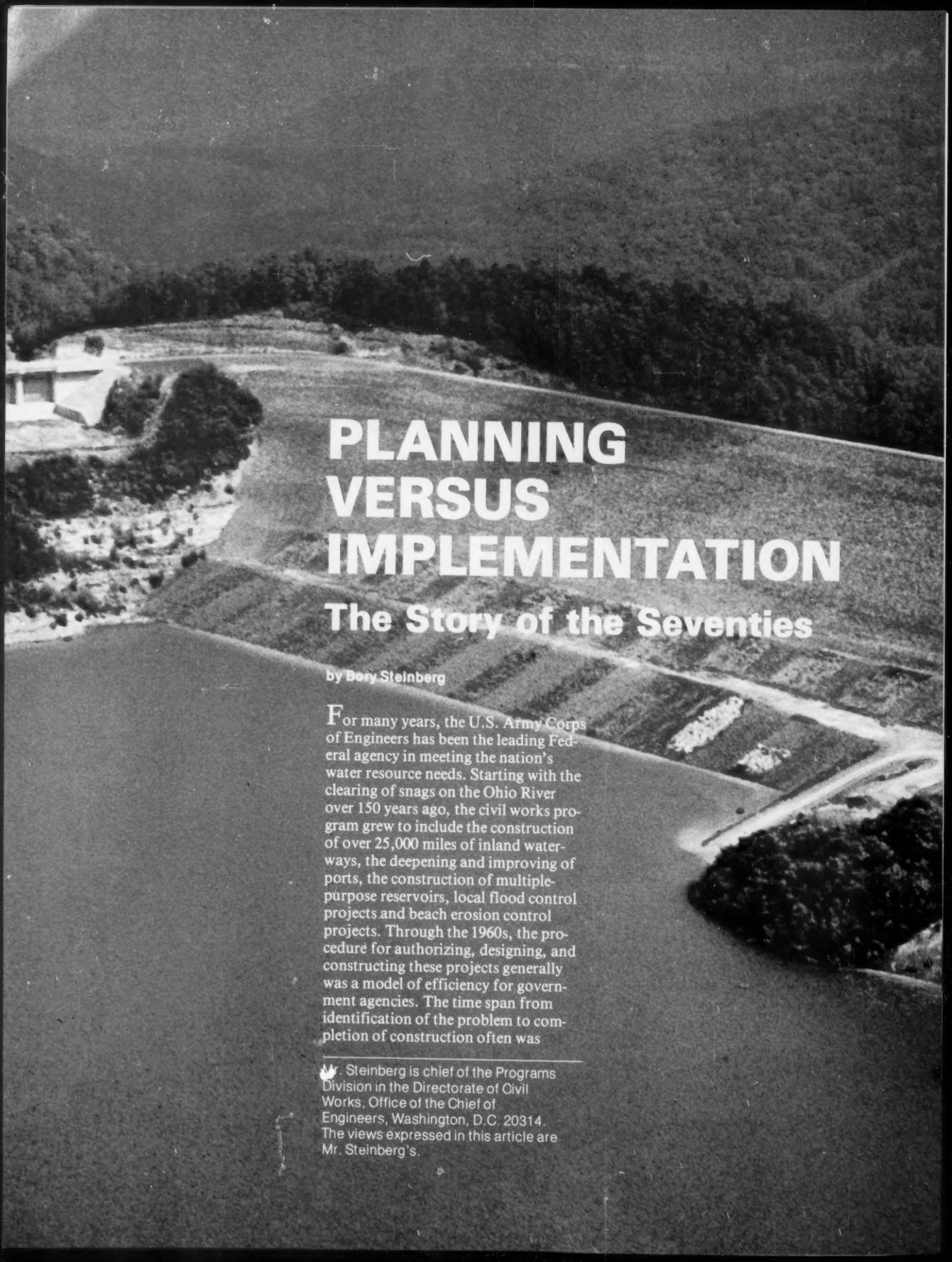
With its worldwide membership and immediate access to government and the public media, CMAS is the most important and respected diver organization in the world. To achieve any credence, to have the ability to make advances in diving and the marine disciplines that divers study and enjoy, an international organization is necessary. As Jacques Dumas emphasizes, "It is at the heart of CMAS to be of service to the international diving community. To work through the Scientific Committee to prevent pollution of the oceans and come to the defense of undersea reefs—that and the standardization of diver training has been our goal."



CMAS President Jacques Dumas (right) points out the expansion of member nations to author at Paris headquarters.
(Photo courtesy of the author)

In achieving these goals, CMAS shines as brightly as the stars it accords international diver certifications. In the spirit of the most recent World Congress of CMAS in Mexico, the hope is that the success CMAS has achieved since 1959 will serve to encourage another twenty years of excellent and dedicated service to divers worldwide, especially now when international understanding is a rare commodity and ocean pollution an international menace. ■





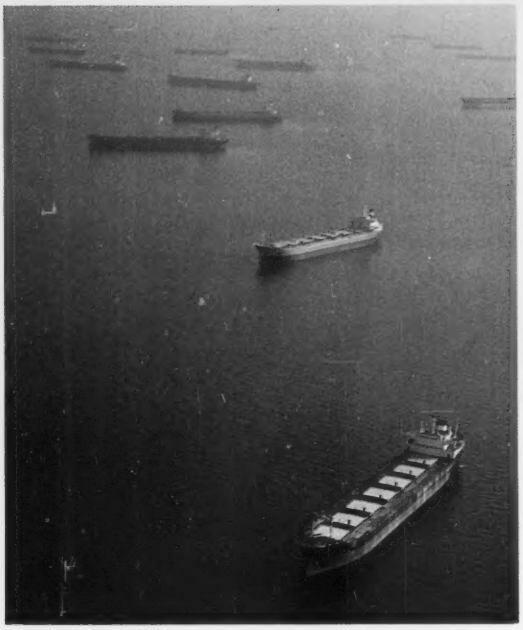
PLANNING VERSUS IMPLEMENTATION

The Story of the Seventies

by Bory Steinberg

For many years, the U.S. Army Corps of Engineers has been the leading Federal agency in meeting the nation's water resource needs. Starting with the clearing of snags on the Ohio River over 150 years ago, the civil works program grew to include the construction of over 25,000 miles of inland waterways, the deepening and improving of ports, the construction of multiple-purpose reservoirs, local flood control projects and beach erosion control projects. Through the 1960s, the procedure for authorizing, designing, and constructing these projects generally was a model of efficiency for government agencies. The time span from identification of the problem to completion of construction often was

Mr. Steinberg is chief of the Programs Division in the Directorate of Civil Works, Office of the Chief of Engineers, Washington, D.C. 20314. The views expressed in this article are Mr. Steinberg's.



measured in decades, but the record of accomplishment was impressive. It is for this reason that the events of the past decade are disturbing.

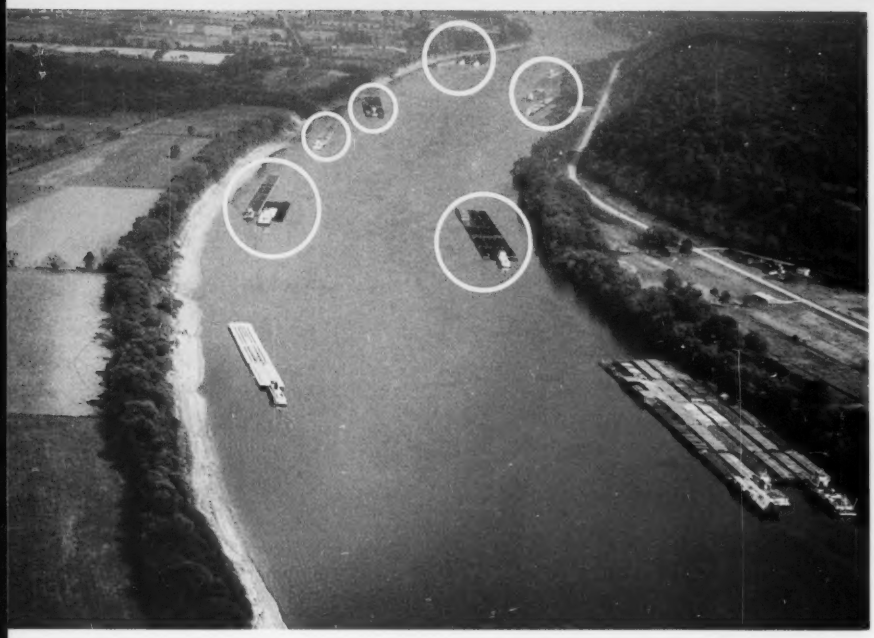
A review of the construction budgets for fiscal years 1972 and 1982 reveals that the number of projects in the budget was about 30 percent higher a decade ago. A more serious indicator is that five of every eight projects in the 1972 budget were authorized for construction in the 1960s while only one of every eight in the 1982 budget was authorized in the 1970s. The slowdown in the authorization process and in the postauthorization process of readying projects for construction in the 1970s is being felt now, in the 1980s.

There has been no major piece of "omnibus" authorizing legislation in more than a decade. The Water Resource Development Acts of 1974 and 1976 authorized 58 projects for the Phase I stage of advance engineering and design compared with less than half that many for construction. The only other omnibus legislation in the 1970s was the act signed into law on December 31, 1970. It authorized some 30 projects. During that year, however, 35 additional projects were authorized by committee resolutions under the provisions of Section 201 of the Flood Control Act of 1965.

Certainly the decade of the 1970s was one of change. The enactment of environmental legislation and the promulgation of rules and regulations have complicated and delayed the construction of many Corps projects, particularly those involving dredging and filling. Yet, dredging problems have a way of working themselves out as more scientific information about the effects of dredging becomes known and as economic pressures balance environmental concerns. A case in point is the deepening of Baltimore Harbor in Maryland from 42 feet to 50 feet. The project was authorized in 1970 and could have been ready for construction several years ago. It was held up by litigation involving the use of Hart and Miller Islands for a diked disposal site until late 1980, when a court decision cleared the way for it to proceed. The heavy use of Baltimore Harbor by deep-draft vessels and the increased demand for coal abroad make this project one of the Corps' leading candidates for a new construction start.

Only one of the 58 projects authorized for the Phase I stage of advance engineering and design in 1974 and 1976 has been authorized for construction. This means that water resource needs studied in the 1960s or early 1970s and identified as meriting construction will, for all practical purposes, not be implemented until the mid-1980s at the very earliest and perhaps not even then. These Phase I projects were merely authorized for reconfirmation of the project formulated in the survey report. Furthermore, the procedure for advancing beyond Phase I for 45 of the 58 projects is such that only two projects have proceeded to the Phase II stage of advance engineering and design. The remaining 13 projects could not advance without further authorizing legislation.

A review of the Phase I authorizations in the 1974 and 1976 Water Resource Development Acts reveals that a number of the projects were still undergoing the Washington-level review or had been fully reviewed but had not been transmitted to Congress for authorization. Some were contro-



LEFT: Hart Island, one of two islands to be used for future disposal of dredged material from Baltimore Harbor. The Port of Baltimore started diking Hart and Miller Islands in September 1981.
(Corps of Engineers photos)

CENTER: Coal ships anchored below Chesapeake Bay Bridge awaiting entry to Baltimore Harbor.

RIGHT: Queues of barges on the Ohio River waiting to lock through at Gallipolis.

versial and would require considerable planning on the part of the Corps in its formulation of a solution that would be institutionally acceptable. Others met the full test of the review process and were transmitted to Congress for authorization but subsequently received less enthusiastic support at the local level. Upstream landowners and environmentalists opposed reservoir Phase I projects, and the value of flood control, water supply, and recreation failed to generate sufficient political support for the project. More detailed planning and engineering during preparation of several Phase I projects revealed a lack of economic justification based on latest costs and estimates. However, other Phase I projects producing high priority outputs undoubtedly would have been under construction or at least considered as new construction candidates in recent budgets had they been authorized for construction. Examples include flood control projects in Rochester, Minnesota, and Richmond, Virginia, and commercial navigation improvements at Gallipolis Lock and Dam on the Ohio River and in Charleston Harbor, South Carolina, and the McNary second powerhouse on the Columbia River in Oregon and Washington.

The replacement of the existing Gallipolis Lock and Dam was also victim to a "Catch 22" situation. Before 1974, 47 of 53 locks on the Ohio River had been authorized for replacement by the Secretary of the Army under the provisions of Section 6 of the 1909 River and Harbors Act. The modernization of the Ohio River locks and dams is essentially complete today except for three locks and dams near Pittsburgh, a replacement for the lowermost two locks and a modern 1200 foot lock at Gallipolis about one-third of the way down the 981 river miles from Pittsburgh to Cairo, Illinois. The court ruling on Lock and Dam 26 essentially prohibited the utilization of the Secretary of the Army's authority. The result was that a study completed in 1974 and approved by the Board of Engineers for Rivers and Harbors in that same year had to be redone. The Phase I authorization in 1976 and other requirements imposed on the Corps resulted in a massive new study, completed in 1981, recommending a replacement lock and dam with a benefit-cost ratio of 12.9 to 1. The queues at Gallipolis will get longer until the new structures are authorized and built.

In 1978, Rochester, Minnesota, experienced its most damaging flood in recorded history. Five lives were lost and damages exceeded $58 million. Had the project for the Zumbro River at Rochester been in place, it would have more than paid for itself in that one flood. Now, more than seven years after it was authorized for the Phase I stage of advance engineering and design, the project still awaits authorization for construction, with little likelihood that the process will permit construction to start before 1984.

There are other projects in the Phase I category that would provide flood reduction measures in major urban centers. Two of the most challenging problem areas are the Passaic River Basin in New Jersey and New York and the Santa Ana River Basin in California. Construction on floodplains and upstream urbanization have made these two heavily populated basins particularly vulnerable to heavy damages in the event of a major flood. While the solutions to the potential disasters are wrought with institutional difficulties, the lack of an authorization for construction inhibits moving ahead. These projects can succeed only with intensive local support. The solutions must be innovative and will be expensive.

Severe flooding in Rochester, Minnesota, in 1978 resulted in $58 million in damages and the loss of five lives.

DISCOUNT RATE AND BENEFIT CALCULATION CHANGES

Corps policy in 1970 called for using the discount rate in effect on 24 December 1968 for all projects authorized by December 1968 for which local interests had indicated a willingness by 31 December 1969 to provide the necessary assurances of cooperation. Projects lacking local support at that time or subsequently authorized had their benefit-cost ratios calculated using a higher interest rate. This rate is based on the average yield during the preceding fiscal year of marketable securities of the United States which, at the time the computation is made, have 15 years or more to maturity. This rate is not raised or lowered more than one-quarter of one percent for any year. This means of determining the appropriate discount rate was subsequently enacted into law in 1974.

In the calculation of estimated annual benefits and costs for Corps projects, the appropriate discount rate used is determined by one of three rules:

- If the project was under construction in 1969 or before, the discount rate used is that in effect when initial construction funds were appropriated. This means 3¼ percent, the rate in effect in 1969, or lower rates ranging downward to 2½ percent. This rate remains in effect for the duration of construction.
- If the project was authorized by December 1968 and adequate assurances of local cooperation were provided to the Corps by 31 December 1969, the discount rate used in calculating annual benefits and costs is 3¼ percent. This was the rate in effect immediately prior to 24 December 1968. Projects falling into this category are said to have their discount rate "grandfathered," i.e., 3¼ percent regardless of when construction is ultimately undertaken.
- All projects not falling into the other categories are said to have a floating discount rate, which generally has climbed one-quarter of one percent per year since fiscal year 1970, when the rate was 4⅞ percent. The rate in use by the Corps during fiscal 1982 is 7⅞ percent. This increase is based on the higher average yield of long-term marketable securities of the United States in recent years, with the proviso that it not change by more than one-quarter of one percent in any year since 1970.

The tendency of the Corps to be conservative in calculating potential project benefits, the fact that secondary

The project for the Zumbro River at Rochester still awaits authorization for construction, with little likelihood that construction will start before 1984.

benefits are not counted by the Corps in benefit-cost calculations and the fact that social well-being and regional development benefits are not used as a basis for project justification—despite authorizing legislation to the contrary—are arguments for using a lower discount rate in benefit-cost calculations. One need only look at the economic benefits of hydropower calculated a decade ago versus now or at the very substantial underestimation of having deeper navigation channels at major coal exporting ports to realize how conservative the Corps benefit calculations are.

Perhaps an even more compelling argument for using a lower discount rate in calculating benefit-cost ratios is that the major beneficiaries of Corps projects will be future generations. Therefore, the use of a social rate of time preference, politically determined, needs to be used for discounting in order that future generations are protected against the profitability of private investment in this generation.

The impact of using a higher discount rate can be illustrated in Corps water resource projects authorized in 1962 where the interest rate used in benefit-cost calculations was 2⅞ percent. It has been estimated that if the discount rate had been increased to 6 percent at that time, 64 percent of those projects would have had a benefit-cost ratio less than unity. One of the projects authorized in 1962 was Bloomington Lake in Maryland and West Virginia. At the time it was authorized, the benefits to be provided by this project were flood control, water supply and water quality control. The authorizing document shows a benefit-cost ratio of 1.6 to 1 using a discount rate of 2⅞ percent. While projects such as Bloomington Lake, with significant water supply and water quality control benefits, are not adversely affected by using higher discount rates, navigation and recreation benefits are severely affected. The result would probably have been a project with a barely favorable benefit-cost ratio at today's discount rate.

The costs allocated to water quality and water supply were 41 and 33 percent, respectively, in the Bloomington Lake project. Although benefits from water quality releases were considered widespread and therefore were recommended for full Federal costs, the water supply costs are reimbursable. Ten years after Bloomington Lake was authorized, Public Law 92-500, the Federal Water Pollution Control Act Amendments of 1972, was enacted into law. Section 102(b) of that act gave the Environmental Protection Agency (EPA) veto power over "the need for, value of, and impact of storage for water quality control." Since that time, EPA has consistently exercised its veto power in this matter by contending that "reservoir storage is a poor substitute for at-source pollution control measures." EPA recognized "that the best available technology for water pollution control may not be sufficient, in all instances, to attain the desired water quality." Nevertheless, storage for this purpose was subsequently disapproved for Corps reservoir projects. The Corps' position was that "the initial appropriation of funds to begin any phase of construction, and the approval of the appropriation act by the President, constitute an authorization that cannot be reversed by the subsequent provisions of Section 102(b)." This view was subsequently upheld by the Fourth Circuit Court of Appeals. Bloomington Lake,

which received its initial construction funds before enactment of Public Law 92–500, was permitted to continue to include the storage in the reservoir for water quality control and to count the benefits it would provide in subsequent budget justification material submitted to Congress.

Today's ground rules for calculating benefits permit the inclusion of flood control benefits for activities not presently in the floodplain only when it can be demonstrated that the activity will have a larger income at the floodplain site than at the next most efficient available alternative site. This is generally most difficult to establish in justifying a reservoir project. In the case of Bloomington Lake, about 40 percent of the flood control benefits would be difficult to justify because they were based on future development. Although the intent of not counting the protection of future development as a project benefit has as its basis Federal legislation and executive orders, the benefits are very real once the project is constructed.

It is only now, some twenty years after Bloomington Lake was authorized, as the project goes into operation, that the value of the lower discount rate, the prior methodology for calculating flood control benefits, and the inclusion of water quality control storage can be appreciated. Bloomington Lake is the only major surface storage constructed in the past two decades or likely to be constructed in the 1980s which provides a new source of water supply for the Washington, D.C., metropolitan area. Many other potential reservoirs in the Potomac Basin were studied and two were even authorized for Phase I design. The Salem Church Lake on the Rappahannock was considered as a potential water supply source but failed to receive necessary non-Federal support.

The storage in the lake includes 92,000 acre-feet for water supply and water quality control. Contracts with the Maryland Potomac Water Authority for initial water supply amount to 7158 acre-feet of reservoir storage. A contract for the remaining water supply storage (38,857 acre-feet) will probably be entered into shortly. That leaves 51,000 acre-feet reserved for water quality storage and 36,200 acre-feet for flood control. Reservoir releases for water quality improvement will mitigate the effects of slugs of acid water from active and abandoned coal mines flushed out by rainstorms. These non-point sources of pollution often extend many river miles downstream beyond Bloomington Lake, Maryland, and degrade the quality of water and aquatic life. While such releases also enhance water supply free of charge, there is no guarantee that such releases to the Washington metropolitan area water supply intakes would arrive when most needed. The Corps' Baltimore District is studying the possibility of increasing the water supply storage and decreasing the water quality and flood control storage. Suppliers of municipal and industrial water in the Washington area have indicated a keen interest in purchasing such storage. Thus, Bloomington Lake, a project that probably would not even be authorized under today's ground rules, was dedicated in September 1981 and will provide benefits to the people of Maryland, Virginia, and the District of Columbia for many years to come, with a substantial portion of its construction and operation and maintenance costs reimbursed to the Federal government over the project life.

Passaic River flood in Denville, New Jersey, 1979.

A BREAKDOWN IN THE SYSTEM, 1978-1981

The failure of Congress to enact a water resource development act since 1976 is only part of the Corps' impasse.

To illustrate how changes in the rules of the game have restricted projects from moving to the authorization and construction stage, several water policy initiatives proposed by former President Carter, but never implemented, remain an impediment to the processing to Congress of reports that recommend authorization of projects. In June 1978 President Carter announced these initiatives, including one on cost sharing. His proposal called for a 5 to 10 percent up-front state financing contribution and a 20 percent cash in kind, or monetary contributions over a period of time on flood control projects, including reservoir and hurricane projects.

By executive order President Carter established an independent review board in the Water Resources Council whose task was to review on behalf of the administration survey reports with favorable recommendations for technical adequacy prior to transmittal to Congress for authorization. The board was also to review proposed new construction starts on behalf of the administration.

Congress never funded the independent review board and, as a result, the executive order was never implemented. In the interim, over 50 survey reports, design memoranda, significant post-authorization change documents, and similar documents were transmitted to the Water Resources Council for review but remained there without action while the council awaited authorization of the board. Thus, the Corps was faced with a standoff between the administration and the Congress. Projects recommended for authorization were not being transmitted to Congress. The budgeting of new construction starts stopped and additional survey reports with favorable recommendations were no longer being transmitted to the Water Resources Council or the Congress. The process has taken on further complications with proposed legislation for user fees on navigation projects submitted to Congress by the Reagan administration. There is a compelling argument for user fees and up-front financing during this period of high budget deficits. However, it is also a fact that navigation projects now being considered as new construction starts were authorized by Congress without user

Santa Ana River near San Diego Freeway.

fees. Similarly, flood control projects being considered as new starts were authorized with the traditional ABC's of local cooperation. While the hope is that innovative financing will produce some local interests able to meet the new cost sharing and up-front financing proposals, it is also reasonable to expect further delays in implementing many projects that are ready for construction.

The standoff between the Carter administration and the Congress on cost sharing even impacted projects with an estimated Federal cost under $15 million. Such projects otherwise might have been authorized by resolution of the House Public Works and Transportation Committee and the Senate Environment and Public Works Committee under the provisions of Section 201 of the Flood Control Act of 1965, as amended. Section 201 permits the authorizing committees, by means of committee resolutions, to authorize Corps projects with a Federal cost of under $15 million where the Secretary of the Army recommends such projects in accordance with existing cost sharing legislation. Since President Carter's new cost sharing proposals were never enacted into legislation, no Section 201 projects were authorized after June 1978. This compares with over 80 Section 201 projects authorized between 1970 and 1978 of which 31 have been constructed or are under construction. Nine others have received all of their preconstruction planning funds and are potential new construction starts.

Another less obvious, but nonetheless critical, impact of the failure to obtain necessary project authorizations and to overcome other delays experienced in the processing of documents once they reached the Washington-level review has been the inefficiencies in the Corps' districts in completing preconstruction planning and engineering. The breakdown of the authorizing process and the feeling that once a favorable project makes its way to Washington it gets lost in a maze of red tape is pervasive in the field offices. Corps professional planners and engineers who have spent several years formulating and designing projects to comply with myriad rules and regulations are disheartened and frustrated when they are faced with the Washington-level impasse.

It is unclear whether the impasse between 1978 and 1980 was intentional, the dysfunctional result of a power play between the executive and legislative branches, or a matter of benign neglect. Nonetheless, the policies of the Reagan administration, which call for greater non-Federal contributions than did those of the previous administration, may well extend the duration of the impasse unless some sort of grandfathering is agreed upon. The failure to recognize the impasse for what it is—a lack of responsiveness to the public in meeting its water resource needs—and to do something about it should be foremost in the minds of the executive and legislative branches as they wrestle with water resource policy issues. In this respect, the policies and practices of the 1950s and 1960s were far superior.

Tug Fork Valley, West Virginia. The steep slopes surrounding the valley offer limited space for relocation out of the floodplain. This situation helps explain why Tug Fork is the only legislative Phase I project to be authorized for construction.

The political climate and ground rules under which the Corps operated then were more suitable for meeting the water resource needs for the nation. The distinction between Federal and non-Federal roles in planning and constructing water projects was more liberally interpreted so that protecting the interest of future generations was more readily accepted. Federal involvement when long-range financial returns were not sufficiently attractive in the short-range view of private enterprise, or when costs were included for purposes not readily marketable, or when problems of comprehensive and coordinated development could not be readily resolved below the Federal level, were recognized as Federal responsibilities. Projects were authorized and built based upon this philosophy. This required a coordinated Federal (both executive and legislative) role in the authorization and appropriation process and cooperation at the state and local level. Public perception and political reaction to water projects were more amenable to their being built. The time has come to look at the waste of resources and benefits foregone as a result of the inaction of the 1970s and to turn things around in the 1980s.

RECOMMENDATIONS

In the interest of responsiveness to the public—and certainly this is a measure of government efficiency—cost sharing of projects that have been recommended for construction should be grandfathered. Changes in the rules after many years of study are unfair to all parties concerned and in the long run make the projects more costly.

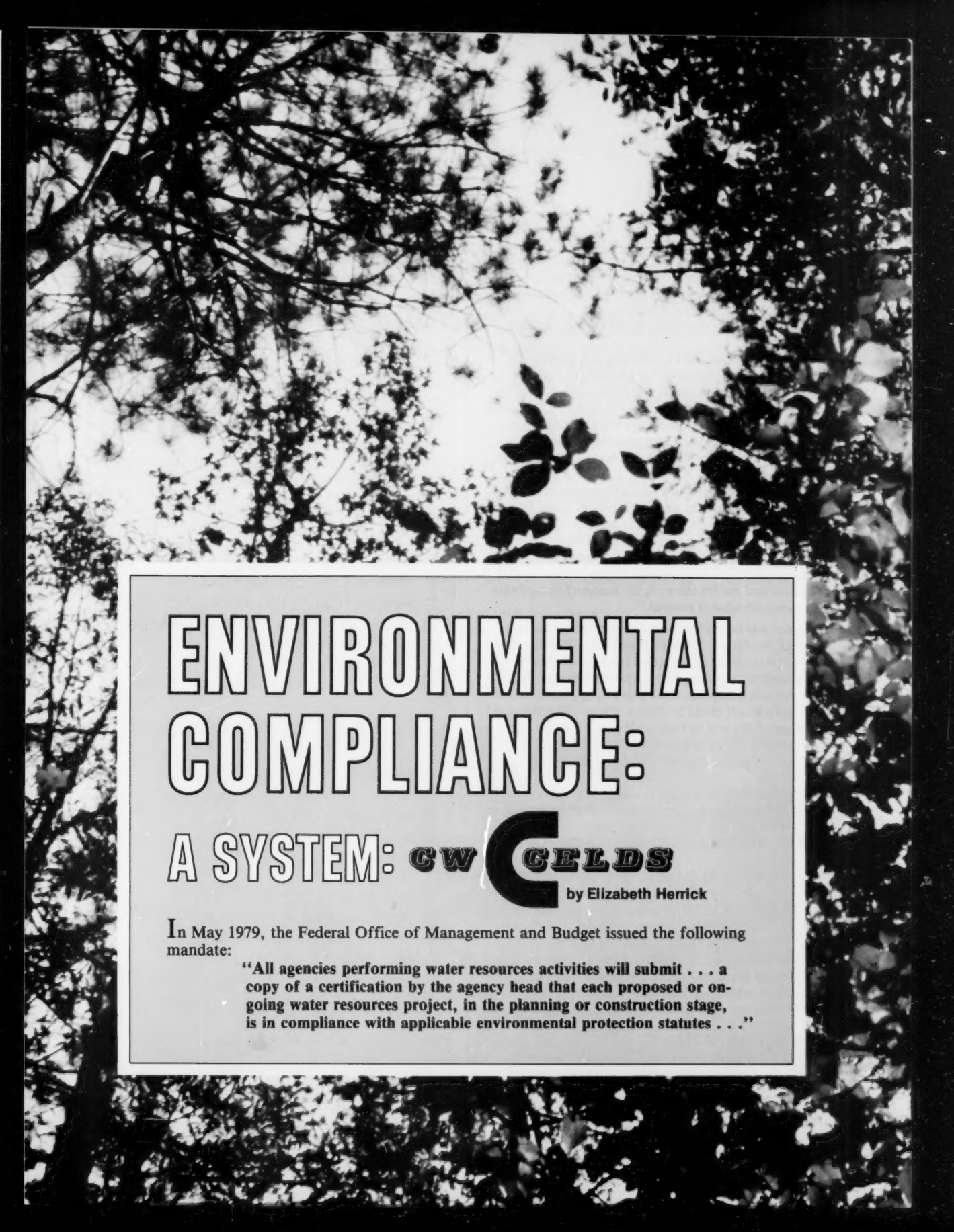
A more realistic approach to calculating benefits is required. If a benefit can be expected to accrue, then it is worthy of being included in benefit-cost calculations. Thus, areas to be protected by Corps flood control projects should include benefits based upon reasonable future development; water quality storage (which may some day also be used for water supply) should be included as a valid benefit; and lower, rather than higher, discount rates are called for.

Bloomington Lake, dedicated in September 1981, will be a most important source of water supply for the Washington, D.C., metropolitan area for years to come. Under today's ground rules, it is unlikely that Bloomington Lake would be authorized.

A revitalization of authorities that Congress previously delegated (through legislation) to the legislative committees, the Secretary of the Army, and the Chief of Engineers is sorely needed. These authorities either have become unusable or have limited applicability because of cost limitations which have been overtaken by inflation. This recommendation includes:

- Revising Section 6 of the 1909 act so that replacement locks and dams can be built when approved by the Secretary of the Army. The legislation should permit locks to be sized so as to meet anticipated traffic and tow sizes. The intent is to avoid the unconscionable delay that has been experienced at Lock and Dam 26, Gallipolis, and other locations.
- Rewriting Section 201 of the Flood Control Act of 1965 to permit adoption of resolutions by the legislative committees of Congress which could authorize construction of projects as recommended by the Secretary of the Army regardless of whether the cost sharing was consistent with existing legislation. The projects authorized under this proposal would be the "favorable" survivors of the full review cycle—Division Engineer, Board of Engineers for Rivers and Harbors, Chief of Engineers, Secretary of the Army, Office of Management and Budget, states and agencies which had support of the non-Federal sponsor. A $25 million ceiling rather than the present $15 million would be appropriate considering the length of time since that limit was established. This proposal would result in more rapid response to the public, and Congress would merely vest in its own legislative committees a somewhat higher dollar authorizing limit than it has vested in the Chief of Engineers.
- Increasing the limits of Federal participation on projects which are authorized by the Chief of Engineers under the various continuing authorities granted to him by Congress.

These recommendations are made in the interest of efficiency and responsiveness to the public. The review process of a Corps recommendation is as strong as ever. Compliance with environmental legislation and modified principles and standards are still as much a part of the planning process as ever. Public involvement remains a strong element of the planning process. These recommendations are made in the sincere belief that water policy and legislation must be thought of in terms of the future of America rather than in terms of debates of discount rates, theoretical benefit-cost calculations, and frequent changes in cost sharing and financing arrangements. Unless the system is flexible enough to respond to the water resource needs of the nation for which there is a Federal interest, and unless it works, the pejorative label "bureaucrat" can justifiably be pinned on the Federal water resource agencies. ■



ENVIRONMENTAL COMPLIANCE:

A SYSTEM: CWCELDS

by Elizabeth Herrick

In May 1979, the Federal Office of Management and Budget issued the following mandate:

> **"All agencies performing water resources activities will submit . . . a copy of a certification by the agency head that each proposed or on-going water resources project, in the planning or construction stage, is in compliance with applicable environmental protection statutes . . ."**

This mandate has monumental implications for the U.S. Army Corps of Engineers and its 37 district offices throughout the country. Each district which has eligible water resource projects must assess each project for compliance with applicable environmental statutes.

Each district engineer must sign the following certification of compliance:

"All new construction start candidates and continuing projects being recommended for planning (advanced engineering and design stage) and construction funding in the . . . Civil Works budget request of the _____ (cite name of district) District have been assessed as to their compliance with the 15 environmental statutes identified by the Water Resources Council as applicable for certification.

Based on the procedures and regulations governing both preconstruction planning and engineering, I find that the planning and construction projects being recommended for funding in the . . . budget are in compliance with the applicable environmental statutes appropriate to their current stages of implementation. Exceptions are noted on the attached matrix showing the status of compliance for each recommended project."

This format was taken from the Corps directive budget Engineering Circular 11-2-146 (6 June 1980). The directive will apply to projects being budgeted for planning (advanced engineering and design) or construction after fiscal year 1981. All ongoing projects as well as any project in the above category which could become a new construction start after fiscal year 1981 will be included.

Fifteen statutes will be included for fiscal year 1983, with an additional 14 for 1984, a total of 29 environmental statutes.

These same 15 statutes are referenced for certification of compliance in the Water Resources Council's Principles and Standards for Water and Related Land Resources Planning—Level C, 18 CFR, Part 711 (Final rule 29 Sep 80, Federal Register, p. 64398, Table 711.71-2). These laws are also cited in the Corps directive ER 200-2-2 (Environmental Quality: Policy and Procedures for Implementing NEPA) as well as in the Corps' Planning Guidance Notebook.

Because these 15 statutes are so encompassing, determining compliance will be difficult for district offices. Each statute has its own timetable, its own permit requirements, its own reporting requirements, and its own compliance schedules. Each requires coordination, not only with responsible Federal agencies and officials but also with state

Ms. Herrick is a technical information specialist in the Environmental Division of the U.S. Army Corps of Engineers' Construction Engineering Research Laboratory, Champaign, Illinois 61820.

ENVIRONMENTAL STATUES FOR FISCAL YEAR 1983

1. Archeological and Historic Preservation Act (Reservoir Salvage Act)
2. Clean Air Act
3. Federal Water Pollution Control Act (Clean Water Act)
4. Coastal Zone Management Act
5. Endangered Species Act
6. Estuary Protection Act
7. Federal Water Project Recreation Act
8. Fish and Wildlife Coordination Act
9. Land and Water Conservation Fund Act
10. Marine Protection, Research, and Sanctuaries Act
11. National Environmental Policy Act
12. National Historic Preservation Act
13. Rivers and Harbors Appropriation Act
14. Watershed Protection and Flood Prevention Act
15. Wild and Scenic Rivers Act

ENVIRONMENTAL STATUTES FOR FISCAL YEAR 1984

1. American Folklife Preservation Act
2. Anadromous Fish Conservation Act
3. Antiquities Act
4. Bald Eagle Act
5. Federal Environmental Pesticide Control Act
6. Historic Sites of 1935
7. Marine Mammal Protection Act
8. Migratory Bird Conservation Act
9. Migratory Bird Treaty Act
10. Native American Religious Freedom Act
11. Resource Conservation and Recovery Act
12. Submerged Lands Act
13. Surface Mining Control and Reclamation Act
14. Toxic Substances Control Act

and local agencies and officials. Not all of the statutes apply to all projects, so the engineer must first determine applicability, then manipulate a complex set of compliance schedules and required tasks for all applicable statutes. Since the National Environmental Policy Act (NEPA) is one of the 15 statutes, the engineer must also address the issue of compliance in the environmental impact statement (EIS) or other NEPA documentation.

Compliance with environmental statutes by the Corps of Engineers has been difficult in the past because planners at district offices simply have had no way of knowing all the tasks legally required by the legislation. An even greater problem that planners face is integrating these tasks and compliance schedules into planning at the beginning of a project—at the preplanning stage. In this situation, the planner is often faced with last-minute ("panic mode") compliance, which can delay projects and increase costs. Because the OMB directive will eventually encompass 29 statutes as well as implementing regulations, executive orders, regulations issued pursuant to the statutes, and Corps directives, planners must be aware of what constitutes compliance for 29 different statutes for each eligible project. Districts need some effective tools to:

1. determine which statutes apply to a given project;
2. determine what other legislation is involved in compliance (e.g., implementing regulations, executive orders, and Corps directives);
3. determine what tasks in the statutes are mandated for Federal agencies;
4. determine compliance schedules in the statutes; and
5. integrate tasks and schedules for 29 statutes into one overall planning schedule for a project at the preplanning stage.

The Office of the Chief of Engineers (OCE) faced the task of designing a system to help planners and engineers at districts determine compliance with the statutes for each eligible project. The first approach was to attempt to identify those portions of each statute that apply to Federal activities. Once that task was completed, it was necessary to look beyond the law itself to the body of legislation issued pursuant to the law and orders issued to clarify and expand the law. This body includes implementing regulations, man-

All agencies performing water resources activities must certify that each project is in compliance with applicable environmental protection statutes. (Corps of Engineers photos)

dated regulations (mandated by the law), executive orders, and Corps directives. Once these were identified, so were agencies—both Federal and state—responsible for promulgating the regulation and for reporting and coordinating activities.

At this point in the process, flowcharts were drawn up to chart tasks identified as mandatory for Federal agencies by the laws as well as by regulations and directives. The flowcharts were issued in a package to district and division offices in July 1980, and again in March 1981. (The latter package contained revisions for fiscal year 1983.) The packages include a brief summary of each statute as it pertains to Corps advanced engineering, design and construction projects, references to related regulations, and a flow-chart of the law. The flowcharts are binary (yes or no), with a question and answer format. The primary purpose of the flowcharts is to aid in identifying most instances where a project is not in compliance with a statute. The packages were issued with the precaution that non-compliance with regulations and directives issued pursuant to the law is equivalent to non-compliance with the law. There are two separate ending points. One clearly identifies when a project is "not in compliance." The other merely says the "project may proceed." It simply means that, at that point, everything looks good, the major tasks have been completed, and the project may continue in planning and construction. Because of the complexities of the laws and regulations, the package urges the districts and divisions to coordinate the review and certification of projects with their legal staffs.

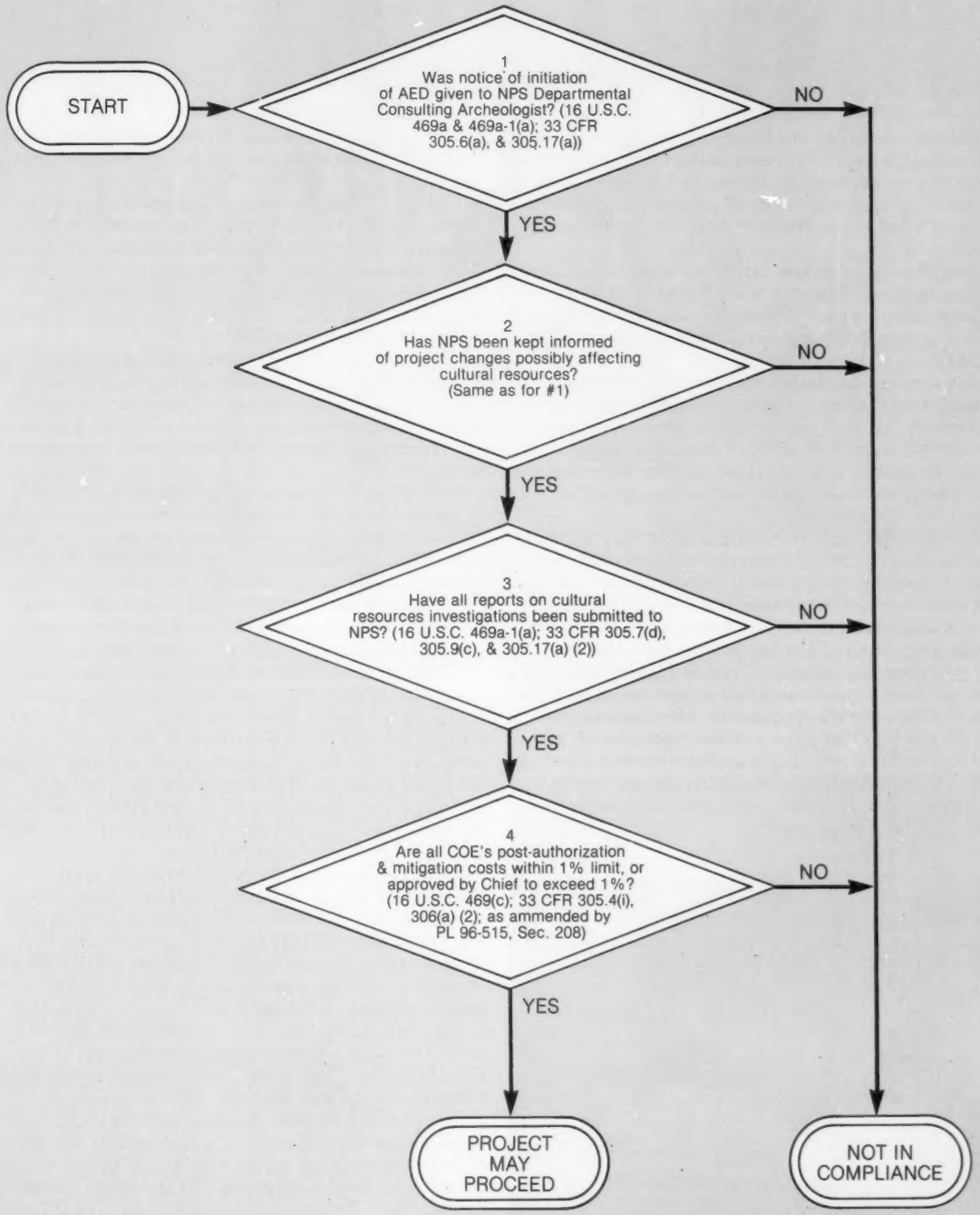
Once the packages were issued in July of 1980, it became apparent that another problem would have to be addressed. As quickly as the package was issued, changes in laws and regulations rendered it obsolete. For example, in December 1980, Congress passed significant changes in the National Historic Preservation Act. These changes eliminated the Heritage Conservation Resource Service and gave enforcement and coordination responsibilities to the National Park Service, Departmental Consulting Archeologist. The district and division offices needed to be apprised of changes in the laws and regulations without constantly reprinting and redistributing the packages.

One solution is a computer system which could be centrally updated as needed and made accessible to all division and district offices. Any changes in legislation could be centrally recorded and immediately available to users of the system. Such a system would reflect the current state of relevant legislation and OCE guidance.

In November 1980, OCE tasked the Construction Engineering Research Laboratory (CERL) to develop such a computerized system based upon the flowcharts. By the following March, the Environmental Division at CERL had developed a pilot system based upon five of the 15 laws. Like the flowcharts, the computerized system relies upon a binary answer system. The system asks a question to which the user responds "yes" or "no." It also had some "help" capabilities in the form of brief explanations of each question. After the pilot system had been demonstrated to a group of potential users, it was revised according to their

Compliance has been difficult because planners at Corps district offices have had no way of knowing all the tasks required by the various laws.

Archeological and Historic Preservation Act, as Ammended


START
1
Was notice of initiation of AED given to NPS Departmental Consulting Archeologist? (16 U.S.C. 469a & 469a-1(a); 33 CFR 305.6(a), & 305.17(a))
NO
YES
2
Has NPS been kept informed of project changes possibly affecting cultural resources? (Same as for #1)
NO
YES
3
Have all reports on cultural resources investigations been submitted to NPS? (16 U.S.C. 469a-1(a); 33 CFR 305.7(d), 305.9(c), & 305.17(a) (2))
NO
YES
4
Are all COE's post-authorization & mitigation costs within 1% limit, or approved by Chief to exceed 1%? (16 U.S.C. 469(c); 33 CFR 305.4(i), 306(a) (2); as ammended by PL 96-515, Sec. 208)
NO
YES
PROJECT MAY PROCEED
NOT IN COMPLIANCE

1-2 (Apr. 81)

suggestions, comments, and input, and the other 10 laws were added. The resulting system, called CW-CELDS (Civil Works Computer-aided Environmental Legislative Data System), was completed for the 15 statutes during the summer of 1981 and is now available for use by Corps installations.

CW-CELDS is an on-line, interactive system designed to take the user through a series of queries based upon the tasks mandated for Federal agencies in each of the 15 statutes. As in the pilot system, the system asks a question to which the user responds "yes" or "no." Based upon the response given, another question is asked. This question–answer format continues until the user receives the response "Project may proceed" or "Project is in non-compliance." The user may choose one of the 15 statutes to follow through the process of question and answer. When that one session or statute is completed, another statute may be chosen.

One suggestion received from the users of the pilot system was to provide for multiple levels of assistance which would reflect the expertise of the user and enable the novice to get more assistance than the knowledgeable user. This suggestion was integrated into the final system, and CW-CELDS provides three levels of help for the user. Each level is available following a question. Thus, instead of answering "yes" or "no," the user could first request one or more levels of help to explain the question. After receiving the help, the user may then go on to answer the question, and the session will proceed. Help is available for each question:

LEVEL I provides a legal citation for that part of the law, regulation, executive order, etc., from which the task in the question was identified.

LEVEL II provides a legal citation as well as the full text of that portion of the law, regulation, executive order, etc.

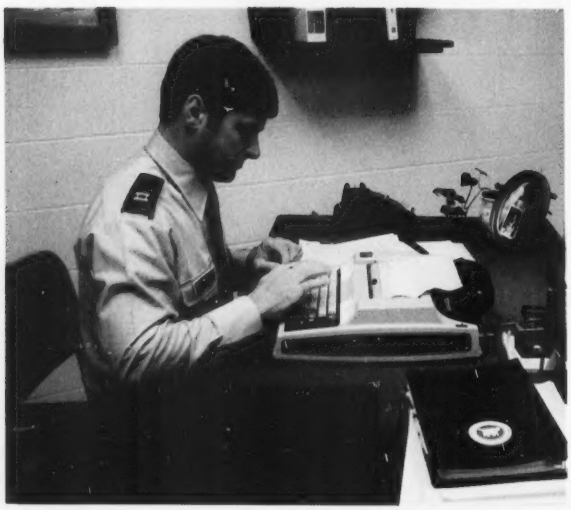
LEVEL III provides a legal citation plus an abstract of that portion of the law, regulation, executive order, etc.

Each level provides additional information such as definitions, agency addresses, and other legal and bibliographic sources. For example, the help files for the Endangered Species Act (16 U.S.C. 1531-1542) tell where the actual list of endangered species can be found.

CW-CELDS is part of a larger system. CERL has developed the Environmental Technical Information System (ETIS), comprised of a number of subsystems designed to aid in the preparation of environmental impact assessments and statements. There are three basic subsystems available through ETIS:

- EICS (Environmental Impact Computer System), designed to enable the user to determine how a proposed action may affect various aspects of the environment.
- EIFS (Economic Impact Forecast System), designed to help planners obtain demographic background information needed in social impact analysis and predict changes which may result from engineering projects.
- CELDS (Computer-aided Environmental Legislative Data System), designed to provide informative abstracts of Federal and state environmental regulations.

It is the last system which is the parent for CW-CELDS. CELDS provides detailed abstracts of environmental regulations. Although these abstracts are not intended to replace the actual document, they do provide clear, concise information without legal jargon on such areas as standards (actual numbers), permit and variance requirements, monitoring and reporting requirements, and compliance schedules. CELDS also provides information such as effective dates, legal citations, names and addresses of agencies promulgating each regulation, and geographic scope of each regulation. Since CELDS contains regulations, the two systems are very closely linked. Compliance with a law also involves compliance with regulations issued pursuant to that law; for example, compliance with the Clean Air Act (42 U.S.C. 7401 et. seq.) involves compliance with ambient air quality standards. These standards can be found in the CELDS system. Thus, in the "help" sessions available on CW-CELDS, the links are made with the parent CELDS system whenever possible. A help session for the Endangered Species Act, for example, would indicate that the list of Federal endangered species with critical habitat designations can be found in the parent CELDS system at accession number 3465. The user can then jump to the CELDS system under that accession number, do the search for the en-



One suggestion from users of the pilot system was to provide for multiple levels of assistance which would reflect the expertise of the user.

dangered species list, and return to the same point at which he left the CW-CELDS system.

CW-CELDS also includes at the end of a session an output chart which graphically shows the user his path through the logic of a particular law. This logic path is designed to record for the user both the questions and his responses to those questions during a session. The chart or output will eventually evolve into a report which can be submitted with budget requests as certification of compliance. The chart also contains some information in addition to questions and answers. For example, if a law requires the filing of a report, the system will ask the user for the date of filing, and this date will be recorded in the chart.

Let us use the Archeological and Historic Preservation Act as the basis for a sample session. As shown, in response to the first question (Was notice given to the Departmental Consulting Archeologist of the National Park Service?) the user has asked for the first level of help—a legal citation to that part of the law (or regulation, executive order, etc.) from which the requirement for filing such a notice was taken. After giving the user the citation, the system again asks the question. The user responds "yes" and the system asks him to enter the date the notice was given. The user enters the date (4 April 1981), and the session continues. After the second question, the user asks to see an abstract of the cited text. Again, the system provides that help, and again repeats the question. The user continues through the question and answer process until the system tells him, "Project may continue." The system then asks the user if he wants to save this session in a file for later use. If the user

A CW-CELDS help session for the Endangered Species Act would indicate where the list of Federal endangered species with critical habitat designations can be found in the parent CELDS system.

Portable terminal.

SAMPLE CW—CELDS SESSION
(Archeological and Historic Perservation Act)

ETIS: What program? *(Type (cr) to see list): 7*

Welcome to the Experimental Subsystem of ETIS
These are pilot systems and databases which may change quickly

XPER: What Program? *(Type (cr) to see list): 12*

Would you like instructions on CW-CELDS usage? *(yes or no): no*

Do you want to see the CW-CELDS Menu? *(yes or no): yes*

Welcome to the Civil Works CELDS system. Please choose a number from the menu below to select the law you wish to see.

1. Archeological and Historic Preservation Act (Reservoir Salvage Act)
2. Clean Air Act
3. Federal Water Pollution Control Act (Clean Water Act)
4. Coastal Zone Management Act
5. Endangered Species Act
6. Estuary Protection Act
7. Federal Water Project Recreation Act
8. Fish and Wildlife Coordination Act
9. Land and Water Conservation Fund Act
10. Marine Protection, Research, and Sanctuaries Act
11. National Environmental Policy Act
12. National Historic Preservation Act
13. Rivers and Harbors Appropriation Act
14. Watershed Protection and Flood Prevention Act
15. Wild and Scenic Rivers Act

:1

Archeological and Historic Preservation Act/Reservoir Salvage Act 16 U.S.C. 469-469c, Public Law 86-523, June 27, 1960; as amended by Public Law 93-291, May 24, 1974, and Public Law, 95-625, November 10, 1978; and Public Law 96-515, Dec. 12, 1980.

Was notice given to the Departmental Consulting Archeologist of the National Park Service (NPS)?

citation

16 U.S.C. 469a Notice of dam construction to be given Secretary of the Interior by United States agencies.

16 U.S.C. 469a-1 Threat of irreparable loss or destruction of significant scientific, prehistorical, or archeological data by Federal construction projects; notice to Secretary of the Interior; survey; recovery, preservation, and protection of data.

33 CFR, Part 305.6(a) General policy.

33 CFR, Part 305.17(a) Coordination with others—National Park Service.

Type carriage return to continue.

Was notice given to the Departmental Consulting Archeologist of the National Park Service (NPS)?

yes

Enter date notice was given if answer is "yes". If notice has not been given, type carriage return (cr) to continue.

:4 Apr 81

Has National Park Service been kept informed of project changes possibly affecting cultural resources?

abstract

16 U.S.C. 469a & 469a-1(a)

A Federal agency must give written notice to the Secretary of the Interior whenever it finds, or is notified in writing by an appropriate historical or archeological authority that the proposed construction of a dam or any other of its activities may cause irreparable loss or destruction of significant scientific, prehistorical, historical or archeological data. The agency may request the Secretary to undertake recovery, protection, and preservation of such data, or it may, with funds appropriated for such project, undertake such activities. Copies of reports of any investigation the agency undertakes must be submitted to the Secretary.

Type carriage return (cr) to continue.

Has National Park Service been kept informed of project changes possibly affecting cultural resources?

yes

Have all reports on all cultural resources investigations been submitted to National Park Service?

Enter the date on which reports were submitted on all cultural resources investigations. If reports were not submitted, type carriage return to continue.

:4 Apr 81

Are all Corps of Engineers post-authorization investigation and mitigation costs within a 1% limit?

text

16 U.S.C. 469c Assistance to the Secretary of the Interior by Federal agencies responsible for construction projects; authorization of appropriations.

(a) To carry out the purposes of sections 469 to 469c of this title, any Federal agency responsible for a construction project may assist the Secretary and/or it may transfer to him such funds as may be agreed upon, but not more than 1 per centum of the total amount authorized to be appropriated for such project, except that the 1 per centum limitation of this section shall not apply in the event that the project involves $50,000 or less: Provided, that the costs of such survey, recovery, analysis and publication shall be considered nonreimbursable project costs.

16 U.S.C. 470h-3

(3) Federal agencies, with the concurrence of the Secretary and after notification of the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate, are authorized to waive, in appropriate cases, the 1 per centum limitation contained in section 7(a) of such Act [see above].

Type carriage return (cr) to continue.

Are all Corps of Engineers post-authorization investigation and mitigation costs within a 1% limit?

yes

Project May Continue

Do you want to see the path you took during this session? *(yes or no): yes*

Do you want the path saved in a file? *(yes or no): no*

Following is a listing of your path through the tree:

Was notice given to the Departmental Consulting Archeologist of the National Park Service (NPS)?
4 Apr 81

yes

Has National Park Service been kept informed of project changes possibly affecting cultural resources?

yes

Have all reports on all cultural resources investigations been submitted to National Park Service?
4 Apr 81

yes

Are all Corps of Engineers post-authorization investigation and mitigation costs within a 1% limit?

yes

Project May Continue

chooses not to save the session, the system will print the output, as shown in the sample session. Notice, in the output, that the date the user entered for giving notice to the National Park Service (4 April 1981) is printed below the question. Thus, this graphic output can be used as a certification of compliance with that statute as well as a method of record keeping for each project.

In the next year, CERL will be adding to CW-CELDS. First, the system will be enlarged from 15 to 29 laws. The second enhancement will be a pre-session to allow users to determine which of the 29 laws apply to a particular project. Once this has been determined, the user can query the system for those laws for which he needs certification. Once the user has checked the individual applicable laws, he can then use the third enhancement—a milestone chart. This milestone chart will allow him to compute compliance schedules for those laws which are applicable to a project. This enhancement is designed to give the user an overview of all necessary tasks as viewed on a continuum. He can then plan projects around these milestones. The milestones will proceed in an orderly, chronologic fashion.

CW-CELDS will provide an effective and innovative method for project managers not only to certify compliance with required environmental statutes, but also to aid in project planning. The project manager will be able to plan for mandated milestones in advance to incorporate required tasks into the planning process. CW-CELDS will allow planners to have access to the most current form of legislation, whether the changes are to a statute, to regulations, executive orders, or Corps directives. These changes can be made centrally on the pilot data base by CERL researchers who will be scanning Federal legislation daily. The changes will then be available to users immediately. The system is easy and efficient to use. The user need have no computer expertise or training; if he can type "yes" and "no," he can use the system. ■

The author wishes to acknowledge the initial work done on the original flowchart package by Todd Snow of the Corps' South Pacific Division. Credit for the initial design concept goes to Dr. John Belshé at the Plans and Programs Office of the Office of the Chief of Engineers.

CW-CELDS will aid in planning as well as with certifying environmental compliance for those projects in the construction stage.

Events, Deeds & Deliberations

CIVIL WORKS CUTBACK ANNOUNCED

Lieutenant General J. K. Bratton, Chief of the U.S. Army Corps of Engineers, has announced his plan for reorganizing various civil works activities throughout the country as a result of Federal budget and manpower cutbacks. The Corps will reduce its civil works staff from 28,235 to 25,240 (10.6 percent) by the end of fiscal year 1982. No field offices will be closed.

The Corps will achieve the reduction with a combination of organizational realignments and functional curtailments that include streamlining some districts and converting the New England Division to a district, centralizing some administrative and accounting functions, reducing or eliminating some recreation activities, further reducing the Corps' dredging fleet, reducing services at lock structures, and reducing personnel at all Corps activities.

The present effort focuses primarily on the district-level structure, which accounts for approximately 90 percent of the civil works staff. The Southwestern and Lower Mississippi Valley divisions will modify their internal boundaries to establish more uniform work loads. New England Division will be converted to a district under the North Atlantic Division; its geographic responsibilities will remain the same. Charleston, Galveston, and Philadelphia districts will be reduced but not realigned. Chicago and San Francisco districts will be converted to smaller, streamlined districts. Chicago will retain its current technical responsibility, with administrative support functions assigned to North Central Division and Rock Island District; San Francisco will perform planning, navigation operations, and regulatory functions. Little Rock District's responsibility for design and

construction will be transferred to Tulsa District; Little Rock will retain responsibility for planning and real estate as well as operation and maintenance of 24 assigned projects.

Administrative reductions will be achieved through centralization of selected finance and accounting organizations, reduced reporting requirements of field agencies, and some centralization of other administrative functions. Approximately 25 percent of the total reduction will be in this area.

Recreation personnel will be reduced about 20 percent. Some recreation areas will be closed; other facilities will be maintained at lower levels than in the past. Local conditions, including the intensity of use and proximity to similar facilities, will be considered.

The reduction of the Corps' dredging fleet has been under way since 1977. The Corps is retaining a minimum fleet to provide for national defense and emergency needs. Approximately eight percent of the total reduction is being made through dredge retirements in areas where industry can do the job.

Changes in lock operation will include reduction or elimination of line handling, changes in the hours of operation, removal of drift at lock structures, modification of the seasonal schedule for lock operations, and modified priorities for the treatment of pleasure boats. Portions of this work will be contracted where economical.

The number of Corps personnel involved in regulatory functions is also being reduced by eight percent. This action will primarily affect the enforcement of the Clean Water Act of 1977. The Corps will be relying more heavily on the use of nationwide permits, rapid processing by other Federal agencies, and public reporting of violations. Small reductions are being made in planning, engineering, and real estate; in these areas the work load associated with the 1982 budget is less than in past years.

This plan will allow the Corps to continue its mobilization mission by keeping most of its engineering, construction, and other technical skills available and well prepared. The Corps will continue its traditional mission of water resource management as well as design and construction for the Army, Air Force, and other Federal agencies.

In making the announcement, General Bratton said, "Despite the reduction in the civil works staff and the necessity to adjust some responsibilities, the Corps will remain an organization of the finest professional and support personnel, military and civilian, who are dedicated to the accomplishment of the missions entrusted to us." □

KEPONE DREDGING CAN BEGIN

The Virginia Marine Resources Commission has conditionally agreed to issue a permit to the U.S. Army Corps of Engineers to dredge 800,000 cubic yards of Kepone-laden sediments from a five-mile stretch of the James River. The commission said the permit will be revoked if the dredging raises the water's Kepone levels above state standards and forces the closing of the river to fishing. The commission also restricted the operations to occur between November and April when fewer migratory finfish are in the river. The action by the commission came after the State Water Control Board's judgment that the $3.5 million project posed no significant danger of resuspending unsafe levels of Kepone in the river. To restore the 25-foot channel depth, the Corps will use suction dredges and will deposit the spoils about 1400 feet away in an area parallel to the channel. (*Water News,* Virginia Water Resources Research Center, October 1981). □

ARCHEOLOGICAL EXCAVATION EXTENDED

The Bureau of Reclamation has awarded a $1.7 million contract extension to the University of Colorado to continue the excavation, analysis, and reporting of ancient Anasazi habitats which will be affected by Reclamation's Dolores Project in Cortez, Colorado. The contract will cover field and laboratory work scheduled for fiscal year 1982.

The area near the Dolores Project is rich in Anasazi culture, dating from A.D. 650 to A.D. 950, and nearly 1200 sites have been located by University of Colorado archeologists. Since some of these sites will be affected by the project, Reclamation began a cultural resources mitigation program in June 1978 to excavate and preserve some of the sites before project construction.

Fieldwork at Dolores is scheduled to end by 1983. Analysis and write-up of the excavations will continue through 1985 at the project's Lebanon, Colorado, laboratory about six miles north of Cortez. A final report is due by the end of 1985.

To date, the Dolores archeology program has produced about 2.4 million items, such as artifacts and environmental samples, from four excavation seasons. Reclamation will display the artifacts at the planned Anasazi Heritage Center west of Dolores, Colorado.

The Dolores Project is designed to provide water for irrigation to about 61,000 acres in southwestern Colorado and water for municipal and industrial use to four Colorado communities. □

CLOUD SEEDING TO BE INVESTIGATED

Colorado's Department of Natural Resources and the Bureau of Reclamation have signed a cooperative agreement to investigate the use of cloud seeding in easing drought and to contine weather modification research and planning. The work done under the 18-month agreement will be supported by $136,080 from Reclamation's Office of Atmospheric Resources Research budget.

Assistant Commissioner Rod Vissia said, "The agreement recognizes that cloud seeding technology is a potentially

important tool for augmentation of the Colorado River water supply that serves the state of Colorado as well as the entire Colorado River Basin and its beneficiaries. The Bureau of Reclamation believes the river's important headwater streams in the Rocky Mountains are the most likely candidates for continued research and development of wintertime cloud seeding. We also recognize the federal government's cooperative responsibility with the state of Colorado and other Basin states to identify, understand, and respond to social and community impacts that may occur under different cloud seeding scenarios."

The cooperative studies under this agreement are aimed at developing state policies for cloud seeding programs that could have both short- and long-range social, economic, and growth effects on Colorado and the entire river basin. There will be no cloud seeding under this agreement. The state will study future needs for project monitoring, suspension situations, and evaluation. Areas where increased snowfall could be expected during future programs will be identified and degrees of impact assessed. Key parties and interest groups will be identified and contacted, and an initial approach to measuring benefits and trade-offs will be suggested in the state's final report.

The cooperative drought study and planning project is part of a program approved by Congress to develop weather modification as a means of lessening the effects of drought and to help meet the increasing demand for water in the semi-arid, western regions of the United States. Colorado will develop a cloud seeding contingency plan and institutional arrangements which could be used to carry out plans for drought relief should funds be available.

Similar drought-related studies are being explored in four other states—Texas, Oklahoma, Utah, and Arizona—under the Bureau of Reclamation program. □

WHALE PROTECTION SET

Secretary of the Interior James Watt has reaffirmed the administration's commitment to the survival of whale populations and has unveiled a plan to provide greater protection to the endangered humpback whales in their summering ground in Glacier Bay, Alaska.

Secretary Watt announced initiatives to:

- Expedite completion of a revised general management plan for Glacier Bay National Park. Federal law requires development of such plans for all new or enlarged Alaska park areas by December 2, 1985. The revised plan for Glacier Bay, which will place particular emphasis on protection and preservation of the humpback, will now be completed by 1983.
- Enact National Park Service rules which limit small vessel entry into the bay to complement existing regulations which limit cruise ship entry and prohibit commercial harvesting of organisms on which the humpbacks feed.

Glacier Bay is the summering ground for the endangered humpback whales. Recently, however, the number of whales using the bay has declined. Watt said, "We don't know the reasons for this decline, but the theories are that boat noise and a decline in feed may have caused the whales to move. The Interior Department has funded studies to determine whether human activities have adversely affected the whales.

"A final decision cannot be made until completion of an ongoing study, scheduled for 1983. Our objective in making these rules effective is to freeze in place the historic levels of activity in the Bay to provide the consistency necessary to complete credible whale studies.

"I want to stress that we will be flexible. If the studies do not support the rules in their current form, we will change the rules. But until we know what threatens these marvelous marine mammals, I want to ensure that further harm does not come to them."

The actions will complement efforts underway at the National Oceanic and Atmospheric Administration to establish a marine sanctuary to protect the humpback's calving grounds off Hawaii. Recent evidence shows that remnant humpback populations in the Pacific migrate from calving grounds off Hawaii to summer feeding grounds in Glacier Bay.

The humpback whale is one of the most severely depleted great whale species. They inhabit coastal waters around the world and have been hunted extensively by many countries. Humpbacks reach a length of 50 feet and can weigh as much as 50 tons. They are famous for the beautiful underwater "songs" they use to communicate with each other. □

RIVER BASIN COMMISSIONS TERMINATED

Executive order has terminated the river basin commissions established by the Water Resources Planning Act. The end of September saw the end of the Great Lakes, Ohio River, New England Rivers, and Missouri River Basin Commissions. The Upper Mississippi River Basin Commission continued until December 31 in order to complete its Upper Mississippi River Basin Master Plan Study.

Federal agency members of the commissions will cooperate in future state and interstate basin planning arrangements. □

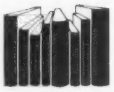
LOUISIANA ALLIGATORS NO LONGER "THREATENED"

The U.S. Fish and Wildlife Service has announced that the alligator is no longer a threatened species in Louisiana and has changed its legal status there from "threatened" to a less restrictive category under the Endangered Species Act. The reclassification gives Louisiana the option to permit a

regulated alligator harvest throughout the state but does not affect alligators in other southeastern states, where they remain classified as "endangered" or "threatened."

Louisiana alligators are now listed under a category called "threatened by similarity of appearance," used for species that are not biologically in danger of extinction but that so closely resemble other species listed as endangered that it is difficult for law enforcement officials to distinguish between the listed and unlisted animals.

The announcement capped a 17-year effort by state and Federal wildlife officials to bring the alligator back from the brink of extinction. That effort, coupled with the alligator's high reproductive rate, attentive care of its young, and ability to adapt to a variety of aquatic habitats accounts for the resurgence. □



Bookshelf

The Living Chesapeake, by J.R. Schubel, is a coffee-table size volume that combines striking black and white photography of the nation's largest estuary with seven essays that recapture the Chesapeake's past, preserve its present, and offer an enlightening look at its future. Available at $19.95 from the Johns Hopkins University Press, Baltimore, MD 21218.

Water Supply and Wastewater Disposal—International Almanac is a reference work and a system for the transfer, evaluation, adaptation, and use of existing knowledge in fields of water supply and wastewater disposal. The almanac will enable any specialist or researcher to find adequate references and information on all questions and aspects of the subject. The increase in the scientific, technical and professional literature has made the specialist's job difficult. Compounding this difficulty has been the lack of a comprehensive bibliography devoted entirely to the literature on water supply and wastewater disposal. Effective selection of bibliographical items and elaboration of a comprehensive bibliography on all subject areas of water supply and wastewater disposal have become a pressing task, and the intention of the authors is to fulfill this task. Volumes 1-5 are available for 130 Dutch Guilders (approximately $55.25) each from the International Institute for Water Supply and Wastewater Disposal, Gooiland 11, 2716 BP Zoetermeer, The Netherlands.

Energy-Efficient Community Development Techniques provides a detailed examination of methods of efficient energy use which can be incorporated into residential and commercial development. The report contains case studies

SUBSCRIPTION ORDER FORM

ENTER MY SUBSCRIPTION TO *Water Spectrum*

□ $8.50 for one year
Add $2.15 per year for foreign mailing.

(No additional postage is required for mailing within the United States, its possessions, Canada, Mexico, and all Central and South American Countries except Argentina, Brazil, British Honduras, French Guiana, Guyana, and Surinam. For shipment to all other foreign countries include additional postage as quoted.)

Send Subscription to: **Please Print**

NAME—FIRST, LAST

ORGANIZATION OR ADDITIONAL ADDRESS LINE

STREET ADDRESS

CITY | STATE | ZIP CODE

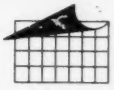
□ Remittance Enclosed (Make checks payable to Superintendent of Documents)
□ Charge to my Deposit Account No. .....

MAIL ORDER FORM TO:
Superintendent of Documents,
Government Printing Office,
Washington, D.C. 20402

of five large-scale projects from Phase I of the Department of Energy's Site and Neighborhood Design Program, an energy glossary, an energy bibliography, and a list of information sources on energy. The 170-page publication is available for $16.75 from the Urban Land Institute, 1090 Vermont Avenue, N.W., Washington, DC 20005.

Saline Water Use and Disposal Opportunities is a Bureau of Reclamation report presenting ideas on how to utilize the saline waters now draining into and degrading the Colorado River—particularly how energy development could benefit from their constructive use. The special report, which has been sent to Congress, was developed with the assistance of a broad range of public and private interests in the affected seven-state area of the southwest. Copies are available from the Bureau of Reclamation, Code D-1000, P.O. Box 25007, Denver, CO 80225.

The Alternative is Conservation (16-mm. color film) was awarded first prize for films by the National Environmental Communicators in 1980. Designed to aid the public education and awareness process necessary to gain acceptance for conservation as a technique in the supply and treatment of the community's water system, the film brings ecological advocacy to the community level with a subject that affects everyone. **Affluent Effluent: New Choices in Wastewater Treatment** (16-mm. color film) is the second in a series of water films produced for community officials, consulting engineers, and government agencies. It examines a variety of practical and creative approaches to wastewater treatment which can save communities money and time in meeting water standards. The film highlights the effects of each approach on the community's ability to grow, its credit rating, the taxes its citizens must pay, and the effectiveness of treatment. These two films, and the handbooks which accompany them, are the result of three years of field research. Rental or purchase may be arranged through Water Films, 30 Bates Road, Watertown, ME 02172. □



Coming Events

Ninth Annual Energy Technology Conference and Exposition, Sheraton Washington Hotel, Washington, D.C., 16–18 February.

Forty-Seventh North American Wildlife and Natural Resources Conference, Portland Hilton Hotel, Portland, Oregon, 26–31 March.

Eleventh Conference of the International Association on Water Pollution Research, Capetown, Republic of South Africa, 29 March–2 April. □

Changes of Command

Major General Charles J. Fiala has been named commander of the U.S. Army Training Center and Fort Leonard Wood, Missouri. His previous assignment was deputy chief of staff of engineers, U.S. Army, Europe, General Fiala succeeds **Major General Louis D. Prentiss,** who retired.

Major General Richard M. Wells has been named director of the Defense Mapping Agency in Washington, D.C. He was division engineer at the North Pacific Division, Portland, Oregon.

Brigadier General Henry J. Hatch, former commander and division engineer of the Pacific Ocean Division, Fort Shafter, Hawaii, has been named deputy chief of staff of engineers, U.S. Army, Europe. □

WRSC-B
DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WATER RESOURCES SUPPORT CENTER
FT. BELVOIR, VA. 22060

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DoD-314

U.S.MAIL

CONTROLLED CIRCULATION RATE

ADDRESS CORRECTION REQUESTED
Forwarding and Return Postage Guaranteed

WASP UNIVE300UDISSDUE0OOR 1
UNIVERISTY MICROFILMS
SERIALS PROCESSING
300 N ZEEB RD
ANN ARBOR MI 48106

Spectacular karst mountains near Guilin, Guangxi Autonomous Region, People's Republic of China. See "China Journal: The Longtan Project" on page 12. (Photo by Richard W. Galster)